You expect efficiency <u>everywhere</u> in your plant...

but here's one place you may have overlooked!

Company washroom costs are not often the object of management scrutiny. But the towels your company provides for its employees and customers represent a steady, continuing outlay—and maybe a much larger expense than necessary.

Don't let "cost per case" fool you

Too often towels are selected on the basis of price alone. But inferior towels can seldom do the job they are supposed to. They can't dry thoroughly—either because they're not absorbent enough . . . or because they're too small . . . or because they turn to mush in wet hands. When that happens an employee naturally has to reach for a second towel—or even a third towel. The savings you were supposed to get wind up in the waste bin.

Prove for yourself the economy of the ScotTissue Towel. *One* ScotTissue Towel dries *both* hands completely. The result is much lower consumption and therefore a lower cost per user. In other words, ScotTissue Towels deliver exactly what you pay for.

An extra bonus in Employee Morale

Scott towels are used by most of your employees in their own homes—so, naturally, they prefer to find them on the job. So soft that many people use them for face cloths, ScotTissue Towels stay strong and serviceable *even when wet* . . . something any user is quick to appreciate.

Test ScotTissue Towels yourself—prove their quality

The best way to evaluate ScotTissue Towels is to prove them against the towels you use now. Your local Scott representative will show you a simple consumption test that can result in substantial savings. Scott also has a "Planned Poster Program" which will do much to cut consumption and promote cleanliness in your washrooms. This program can be yours without obligation—write to Scott Washroom Advisory Service®, Scott Paper Company, Dept. PE10, Chester, Pa.

It's good business to use

SCOTTISSUE® TOWELS

For more facts circle 502 on Reply Card

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DISTRICT MANAGERS

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'ROUND ABOUT with the editors in field and office

Edited by R. L. Marinello

Plant Engineering at Powerama

COMMEMORATING the completion of their 100 millionth Diesel horsepower, General Motors Corporation staged a tremendous exhibit of Diesel power applications in Chicago during the month of September. Named "Powerama," the exhibit featured applications such as an oil field drilling rig, a saw mill, a cotton gin, a great variety of off-the-road construction equipment, and mobile power generating plants powered by Diesel engines.

Awed by the size of the tires on earth-moving equipment at Powerama, Plant Engineering editor Andy Anderson stops Euclid giant for photographer

Powerama was intended to put on display as many applications of Diesel power as possible, most of them in operating trim. All the electricity required to power the exhibits and provide necessary lighting was generated in the Diesel-powered rail car units that were a featured exhibit.

Problems for Plastics?

WE RECENTLY sent out questionnaires to determine in what phases of his work plastics could be of help to the plant engineer.

Several of the respondents who indicated that they had definite problems which might be solved by the use of plastics failed to give their name and address.

One reply was from a candy plant which is looking for a non-sticking, hard-wearing coating material for hot candy slabs. The material should have the following properties: non-toxic, heat resistant, smooth, non-sticky, sanitary and preferably white in color. The company is also looking for a possible means of eliminating the use of starch in the process.

Another reply, from a manufacturer of a roofing tile, mentioned that they use steel and plaster dies for pressing the shapes in tile. One of their problems is releasing the clay from the steel dies. Another is that the plaster dies wear out after a short run. This questionnaire was signed by H. C., Jr.

We would like to hear from these respondents to refer them to several sources where they may find the solution to their problem.

Editor "Hops" to the Shows

After viewing exhibits at Production Engineering Show at Navy Pier, Chicago, Dick Morris, Editorial Director, Plant Engineering, gets ready to board helicopter for trip to Machine Tool Show at International Amphitheatre

Service for Detroit Plants

BRINGING THE laboratory to the problem rather than vice versa offers industrial users in Detroit two distinct advantages, according to Albert Sniderman, of Mobile Testing Laboratory, 21464 Margareta, Detroit.

One advantage is that it makes possible the testing under full work load of equipment or installations which cannot be moved to the conventional laboratory. Typical examples are: dynamic loads in installed conveyor chains; noise

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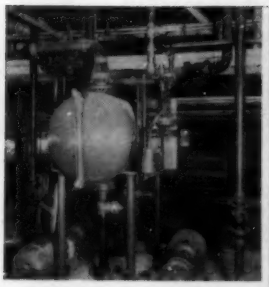
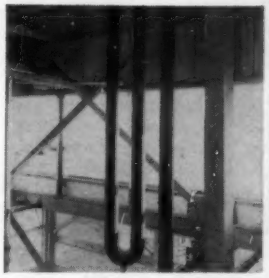


Wrought iron pipe serves condensate pump battery



8" wrought iron condensate overflow line in boiler room

Wrought iron steam return on trestle between buildings

Welding elbow on 10" wrought iron condensate line

10" wrought iron condensate lines in boiler room

In its new Appliance Park, GENERAL ELECTRIC assigns WROUGHT IRON PIPE to corrosion "HOT SPOTS"

Quality—a key word in the planning, designing, and manufacturing of General Electric appliances—is also a basic Company consideration in the application of wrought iron in their new Appliance Park, near Louisville, Kentucky. More than 359 tons of this time-tested material was used to safeguard against corrosion in exposed water lines and steam return lines in all of the five buildings in the plant plan.

Architects and Engineers—Fairbrother-Miehls, Detroit, Michigan; Albert Kahn, Associated Architects and Engineers, Inc., Detroit, Michigan.
Consultants—Eggley-Furlow, Philadelphia, Pennsylvania.
General Contractors—Turner-Strock Construction Company.
Plumbing—Standard Engineering, George Blanford, Louisville, Kentucky.
Heating & Piping—Kerby Saunders, New York, New York; Meyer Ward, Louisville, Kentucky.

Our bulletin, *Piping for Permanence*, discusses these, and many other proved wrought iron pipe services. Write for your copy.

A. M. Byers Company, Pittsburgh, Pa. Established 1864. Boston, New York, Philadelphia, Washington, Atlanta, Chicago, St. Louis, Houston, San Francisco. International Division: New York, N.Y. *Available throughout the world.*

BYERS

CORROSION COSTS YOU MORE THAN WROUGHT IRON

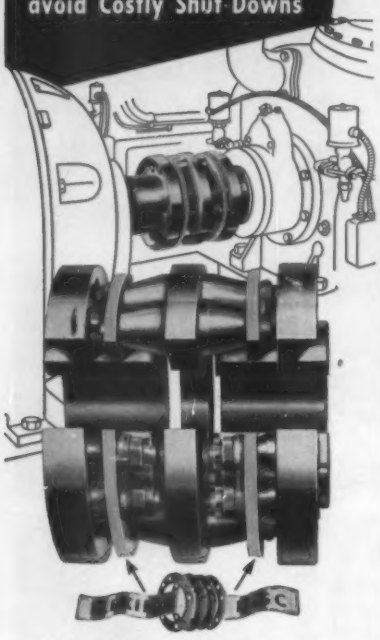
WROUGHT IRON

TUBULAR AND HOT ROLLED PRODUCTS

ELECTRIC FURNACE QUALITY STEEL PRODUCTS

For more facts circle 503 on Reply Card

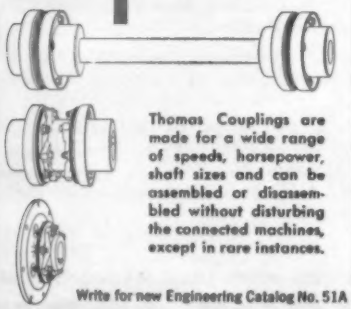
Specify THOMAS ALL METAL
FLEXIBLE COUPLINGS
for Power Transmission to avoid Costly Shut-Downs



Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.

DISTINCTIVE ADVANTAGES

FACTS	EXPLANATION
NO MAINTENANCE	Requires No Attention. Visual Inspection While Operating.
NO LUBRICATION	No Wearing Parts. Freedom from Shut-downs.
NO BACKLASH	No Loose Parts. All Parts Solidly Bolted.
CAN NOT "CREATE" THRUST	Free End Float under Load and Misalignment. No Rubbing Action to cause Axial Movement.
PERMANENT TORSIONAL CHARACTERISTICS	Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained.



Thomas Couplings are made for a wide range of speeds, horsepower, shaft sizes and can be assembled or disassembled without disturbing the connected machines, except in rare instances.

Write for new Engineering Catalog No. 51A

THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA, U.S.A.

For more facts circle 504 on Reply Card

'ROUND ABOUT

of fan installations; cycle timing of spot welders; vibration in machine tools; and field test of earth moving equipment.

A second advantage of testing on the site is that it permits the manufacturer to take part in the test to: 1. Cooperatively plan the test program and procedure; 2. Make necessary fixtures; 3. Observe test in progress; and 4. Determine course

Testing equipment goes right to the plant to check on-the-job installations

of test work, should unexpected results develop.

The mobile test unit consists of a panel truck which houses surface roughness testers, optical comparator, sound level meters and strain gage transducers, amplifiers and indicators for static and dynamic problems.

Metal Conference and Show

ON MONDAY, October 17, and continuing through Friday, October 21, the American Society for Metals will present the 37th Annual National Metal Congress and Exposition in Philadelphia, Pennsylvania.

The conference will be held in the headquarter hotels of the participating Societies; the show will be held in Philadelphia's Arena, Exhibition Hall, the South and Center Buildings and the Commercial Museum, which are near the campus of the University of Pennsylvania.

Course in Spray Painting

WHAT TO AND what not to do when spray painting will be covered in the one-week courses to be held in Chicago. They will be held on October 3 through October 7; November 7 through November 11; and December 5 through December 9.

In addition to a thorough indoctrination in actual spray painting, both manual and automatic, students will learn the operation and servicing of spray guns, paint circulating systems, material handling pumps, oil and water extractors, flocking equipment, compressors and other auxiliary equipment.

There is no tuition fee for this course. Students pay only for their transportation and living costs while in Chicago.

Because of the small size of the class, it is important that applications for attendance be made as far in advance as possible. This may be done by writing to Binks Manufacturing Co., 3122 Carroll Avenue, Chicago 12, Illinois.

Have You Tried Bottle Caps?

PLANT ENGINEERING recently received a letter from an advertising agency commenting on the extensive use of milk bottle caps in industrial plants. One plant in particular is using these caps to seal off exhaust pipes and valve openings during painting operations.

We are wondering how many other plant engineers have employed milk bottle caps in this or some other manner. If you are using these caps in any unusual way in your plant, or if you think different sizes may be of help to you, kindly send a letter to the Editor.

Second Construction Booklet

READERS who took advantage of PLANT ENGINEERING's reprinting of the "Construction Briefs" series last year will be interested to know that the second reprint booklet, covering the next six articles in the series, is now available.

Gathering all the Briefs published from July 1954 to May 1955 into one reference source, the reprint presents the discussions on deflection, horizontal shear, floor loading, framing, columns and practical applications. In general, it continues the material covered in the first six articles.

The booklets are available at the nominal price of 50 cents, as was the first reprint, and can be had by writing to the Editor, PLANT ENGINEERING, 110 S. Dearborn St., Chicago 3, Illinois. Including your payment with your order will be of great help to us in handling the accounting.

If you didn't get the first booklet, and would like to have the complete series to date, just send a dollar and we'll mail both booklets to you posthaste.

Templet Techniques

PITTSBURGH plant engineers will be able to take advantage of the Plant Layout Technical Workshop which will be in their neighborhood in October. The workshop will be held at the Greater Pittsburgh Airport Hotel from October 10 to 14.

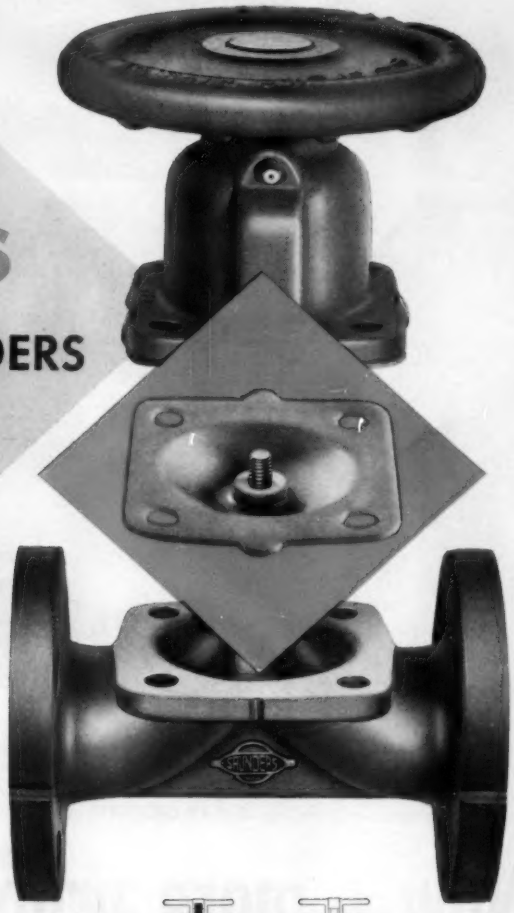
Besides the regular technical lecture periods held each morning, each registrant will be supplied with a complete 100-piece layout of a specific shop problem in his own plant. The layout will be prepared to his own specifications and consist of machines, materials-handling equipment, office equipment, etc.

Readers who would like more information about this plant layout workshop should contact Homer H. Dasey, Plant Layout Technical Workshop, Box 233, Oakmont, Allegheny County, Pa.

Unaffected by all chemicals normally found in industry

Teflon Diaphragms

for GRINNELL-SAUNDERS DIAPHRAGM VALVES

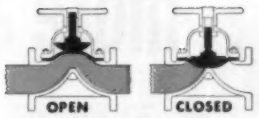


Having valve trouble? Are your chemical services so tough that valves disintegrate? Grinnell-Saunders Diaphragm Valves with TEFLON* diaphragms may solve your problems.

Grinnell TEFLON diaphragms are made by a new and unique process which produces a better product of greater density, toughness and flex life. TEFLON offers a high degree of chemical inertness to all chemicals normally found in industry.

Grinnell-Saunders Diaphragm Valves are available with bodies of iron, bronze, stainless steel, cast steel, aluminum, Monel, Saran, Durimet; and with body linings of glass, lead, soft or hard rubber, neoprene, Saran. Diaphragm life depends on temperature, pressure, and frequency of operation. Your inquiries, which should be accompanied by complete service data, will receive prompt attention.

**Registered Trade-Mark, E. I. du Pont de Nemours & Company, for its tetrafluoroethylene resin.*



- Diaphragm lifts full height for streamlined flow in either direction
- Resilient diaphragm assures positive, leak-tight closure even with grit or scale in the line
- Diaphragm absolutely isolates working parts from fluid . . . sticking, clogging, contamination, corrosion eliminated
- Body, lining, and diaphragm materials to suit service
- Simple maintenance. Diaphragm can be replaced easily without removing valve from line. No packing glands to demand attention. No metal-to-metal seats to become damaged or wire-drawn

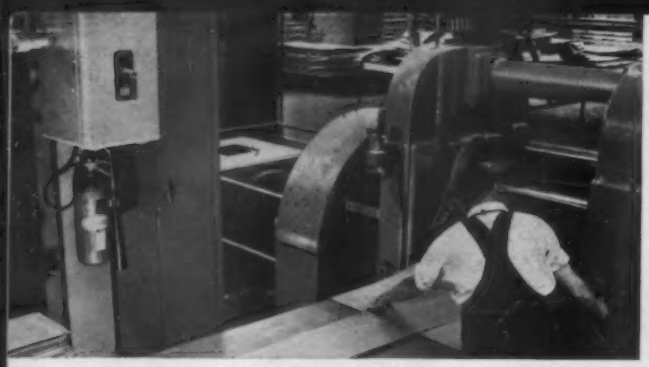
GRINNELL

WHENEVER PIPING IS INVOLVED

Grinnell Company, Inc., Providence, Rhode Island • Coast-to-Coast Network of Branch Warehouses and Distributors

pipe and tube fittings • welding fittings • engineered pipe hangers and supports • Thermolier unit heaters • valves
Grinnell-Saunders diaphragm valves • pipe • prefabricated piping • plumbing and heating specialties • water works supplies
industrial supplies • Grinnell automatic sprinkler fire protection systems • Amco air conditioning systems

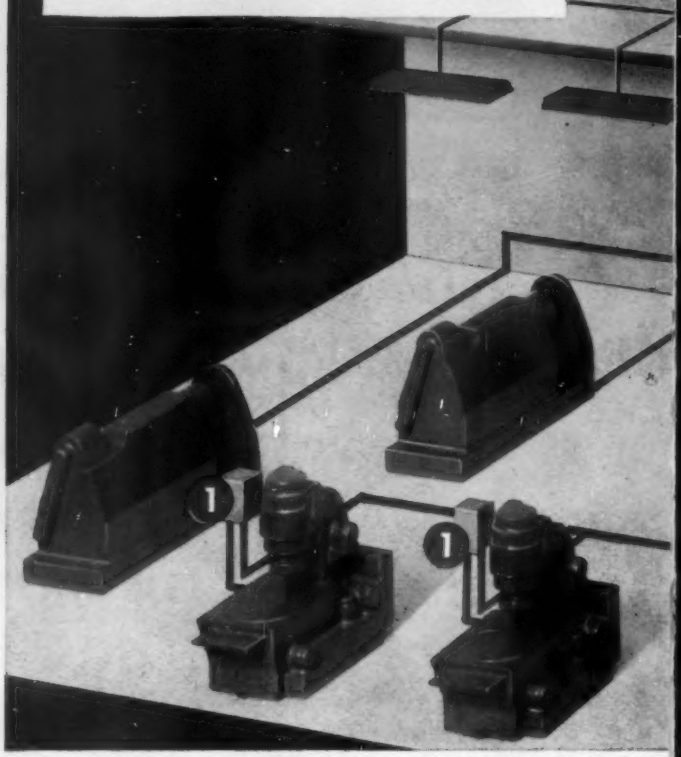
For more facts circle 505 on Reply Card



1. INDIVIDUAL AIR CIRCUIT BREAKERS provide the best protection for control or switching. Particularly suitable for motor control, they can't be "single-phased." Both drawout switchgear and individual breakers have racking device to simplify removal. Ask for Bulletin GEA-5915.

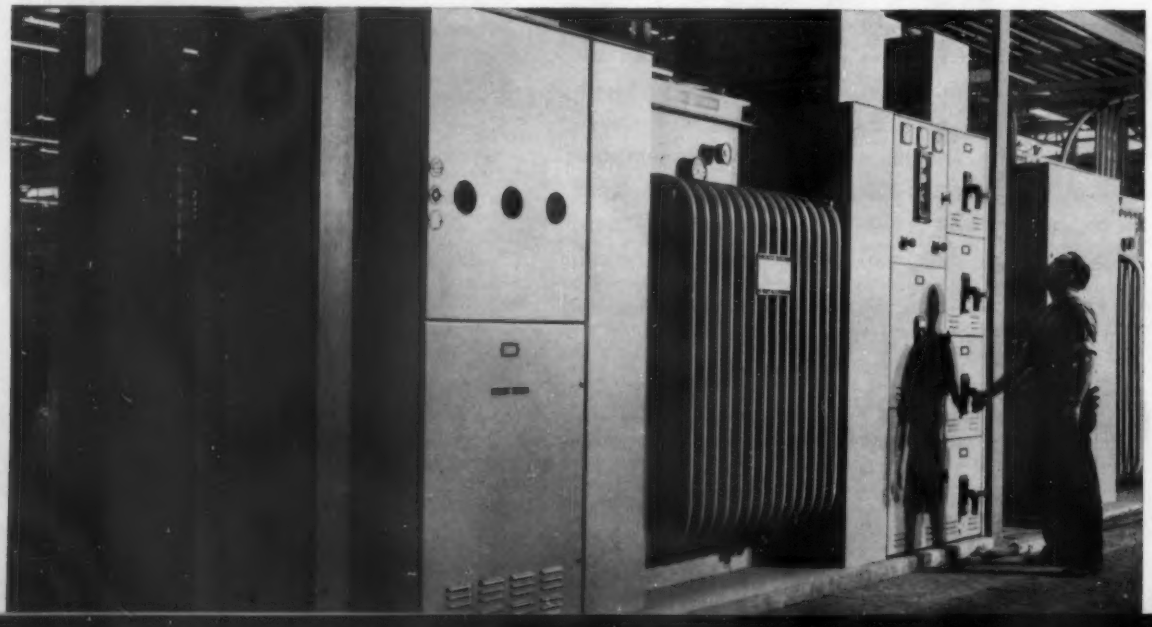
2. DRAWOUT SWITCHGEAR provides a convenient and economical way to locate a number of breakers in one out-of-the-way spot. This conserves valuable floor space and centralizes control. ***These entire equipments*** have been design tested up to maximum short-circuit ratings. Bulletin GEA-5916 gives details.

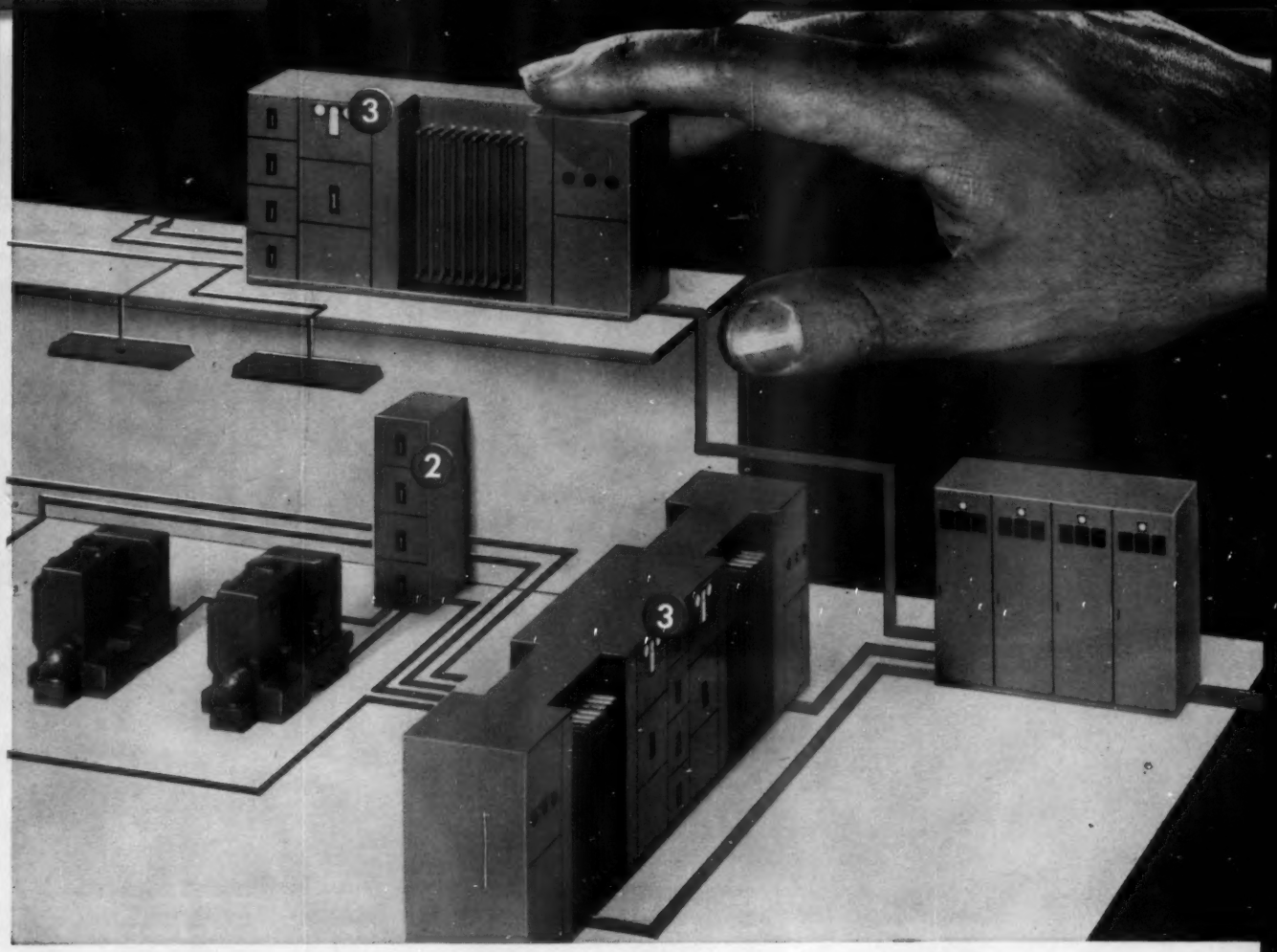
CAN YOU AFFORD A POWER FAILURE AT ANY POINT IN YOUR PLANT? G-E low-voltage switchgear—individual breakers **(1)** drawout switchgear **(2)** and load-center substations **(3)**—is designed to provide maximum protection up to full interrupting rating. This ability is backed up by DESIGN TESTING OF COMPLETE EQUIPMENTS IN THE SWITCHGEAR DEVELOPMENT LAB.



Now... more protection for less cost

3. LOAD-CENTER SUBSTATIONS bring power close to load for most economical distribution. Air circuit breakers are properly co-ordinated with transformer capacity to give optimum protection. For details ask for Bulletin GEA-3592.





at all these vital points...

YOU CAN'T AFFORD ANYTHING LESS THAN THE BEST WITH THE COST OF SWITCHGEAR REDUCED UP TO 33% BY THE INCREASE IN G-E AIR CIRCUIT BREAKER INTERRUPTING RATINGS

THE COST OF POWER DISTRIBUTION SYSTEM PROTECTION IS DOWN—if you are building or modernizing, you can get maximum protection with the right switchgear at about the same price you would have paid for equipment *barely adequate*. You can't afford to let another day go by without being positive that you have complete protection at every vital point in your electrical system. If you have a power system over ten years old, check it now for possible increased short-circuit capacities. Don't risk even a partial power failure when modernizing is so economical.

HERE'S HOW YOU CAN SAVE up to 33% with the recent increase in G-E air circuit breaker interrupting ratings. These increases—25 to 50% for low-voltage applications—permit the use of smaller, and less expensive, breakers at many points in your system . . . in load-center unit substations, drawout switchgear and individually mounted breakers.

CHECK THE PRICE on G-E low-voltage switchgear for your system. You'll be surprised at how favorably it compares with prices on equipment that doesn't offer the same reliability of operation, ease of installation and maintenance, and high degree of safety for personnel.

FOR COMPLETE INFORMATION contact your General Electric Apparatus Sales Representative or write to General Electric Company, Schenectady 5, N. Y. 523-3

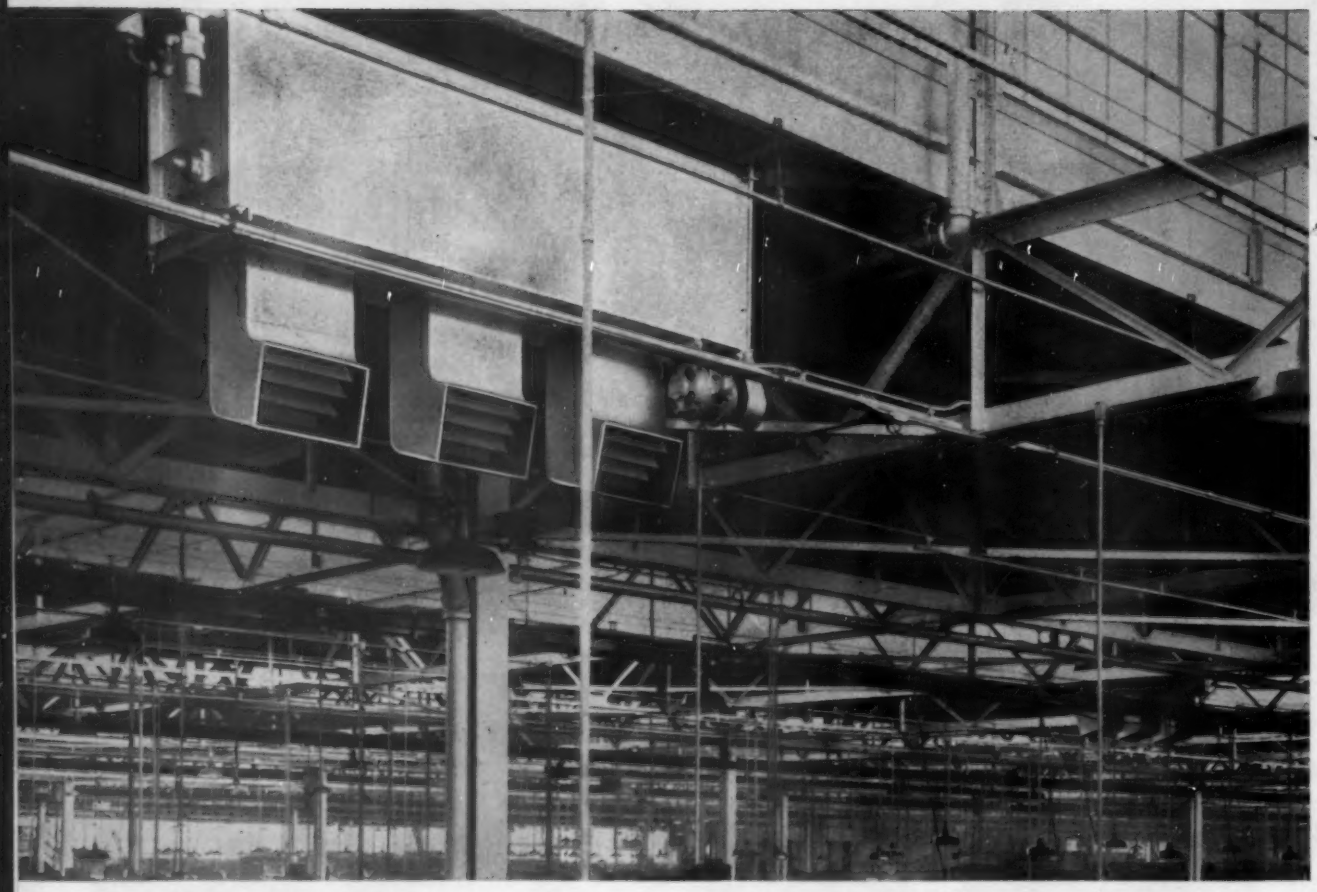
Progress Is Our Most Important Product

GENERAL ELECTRIC

For more facts circle 506 on Reply Card

Here's why Trane Unit Heaters are in such demand:

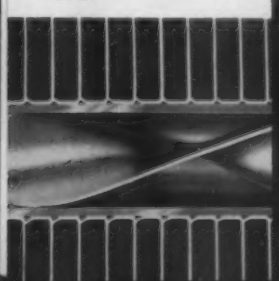
One unit can solve plant air cleaning or



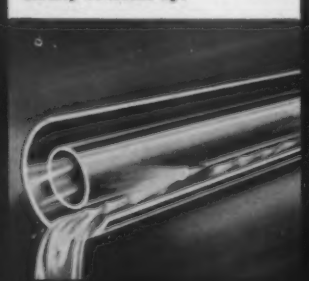
What the Torridor will do: The Torridor can be used to heat large areas where air must be spread over great distances, is equally suitable for heating numerous small rooms or a central system with ducts. It can be used as a combined heating and ventilating unit . . . for blanketing doorways with heat . . . for special process applications such as fog removal, ice melting, drying, curing, etc.

Typical users include: PRATT AND WHITNEY AIRCRAFT; WESTERN ELECTRIC CO.; CARBIDE AND CARBON CHEMICALS CO.; CATERPILLAR TRACTOR CO.; DEERE AND CO.; JOHNS-MANVILLE CORP.; KIMBERLY-CLARK CORP.; CORNING GLASS WORKS; INTERNATIONAL BUSINESS MACHINES CORP.

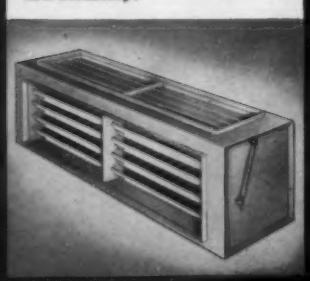
Turbulator in hot water coils assures maximum heat transfer from hot water to surface of coil tubes.

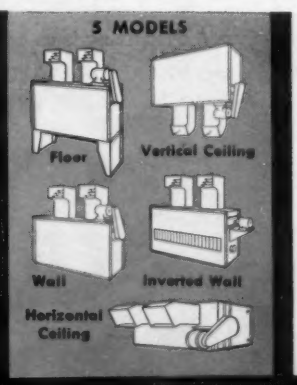


Kinetic orifice in steam coils releases steam in direction of condensate drainage. Reduces possibility of freeze-up.

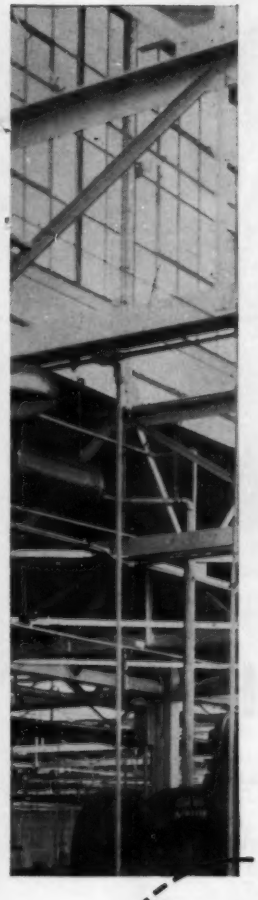


Mixing box blends re-circulated with outside air in any combination. Dampers may be operated manually or motorized. A standard accessory.





heating, ventilating, process-drying needs

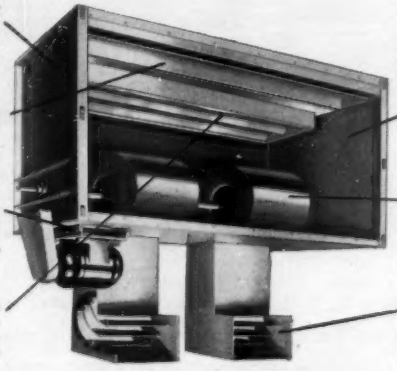


Use this Trane Torridor with or without ducts...in large areas or small...for comfort or process heating and ventilating needs.

One unit does the work of many! A single TRANE Torridor unit can produce as much heat as several propeller-type heaters—plus ventilation. Pipe, valve and fitting needs are less . . . installation and maintenance costs are lower. Capacities up to 1½ *million* Btu's.

Locate Torridors anywhere! Units can be hung from walls or girders, mounted on ceilings, or set on the floor. A wide choice of nozzle arrangements, top or bottom discharge lets you direct warmth in any desired direction.

For hundreds of applications. Heating, ventilating, air cleaning, process heating or drying . . . the amazingly versatile, high-capacity TRANE Torridor solves many of these problems. For complete information contact your engineer or nearest TRANE Sales Office, or write TRANE, La Crosse, Wisconsin.



Rugged casing of bonderized steel. Extra strong, rigid, *welded* construction.

Coil choice of high or low pressure steam, hot water, standard or "non-freeze" SD type.

Hinged motor mounting block for quick, easy adjustment of belt tension.

Damper choice in ventilating models. Face-and-by-pass (shown) or Thermadjust.

Filter choice of permanent or throwaway types, in flat or V-type frames.

Removable panel provides easy access to heart of unit. (Shown removed.)

Quiet fans dynamically and statically balanced on electronic equipment.

Directional vanes in the nozzles straighten air stream, eliminate turbulence.

one source · one responsibility

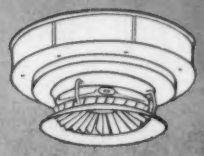
TRANE

Industrial Heating

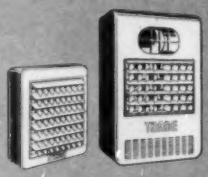
MANUFACTURING ENGINEERS OF AIR CONDITIONING, HEATING, VENTILATING AND HEAT TRANSFER EQUIPMENT

The Trane Company, La Crosse, Wis. • Eastern Mfg. Div., Scranton, Pa. • Trane Co. of Canada, Ltd., Toronto • 90 U. S. and 15 Canadian Offices

Quality products for all your heating and ventilating needs

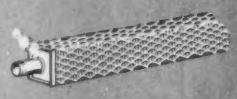


PROJECTION HEATER

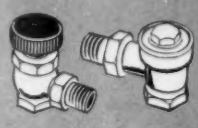


HORIZONTAL HEATERS
Model H—Gas-Fired

WALL FIN ELEMENT

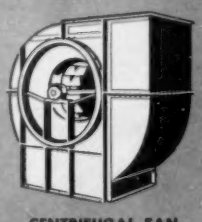


WALL FIN WITH GRILLE

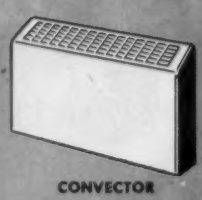


STEAM SPECIALTIES

ROOF VENTILATOR



CENTRIFUGAL FAN



CONVECTOR

There's Steam Economy in FLEXIBILITY

Above, six Erie City Keystones meet a variable heating and processing steam load at the Ohio Masonic Home in Springfield, Ohio

JOSEPH BRESLOVE
& ASSOCIATES
CONSULTING ENGINEERS
CLEVELAND, OHIO

Picture the boiler operating advantages of multiple Erie City Keystone Steam Generators in your plant. Multiple "Keystones" permit high efficiency operation. During periods of low loads, take one or more units off the line—for high loads, the rapid steaming "Keystones" respond quickly to increased requirements.

Compact, completely factory assembled and Factory Fire Tested "Keystones" fit into any plant's variable steam needs.

There is nothing to assemble in the field.

Need steam at some remote plant location indoors or outdoors? Investigate the use of one or more "Keystones." Bulletin SB-51 describes the fully automatically controlled Keystone.

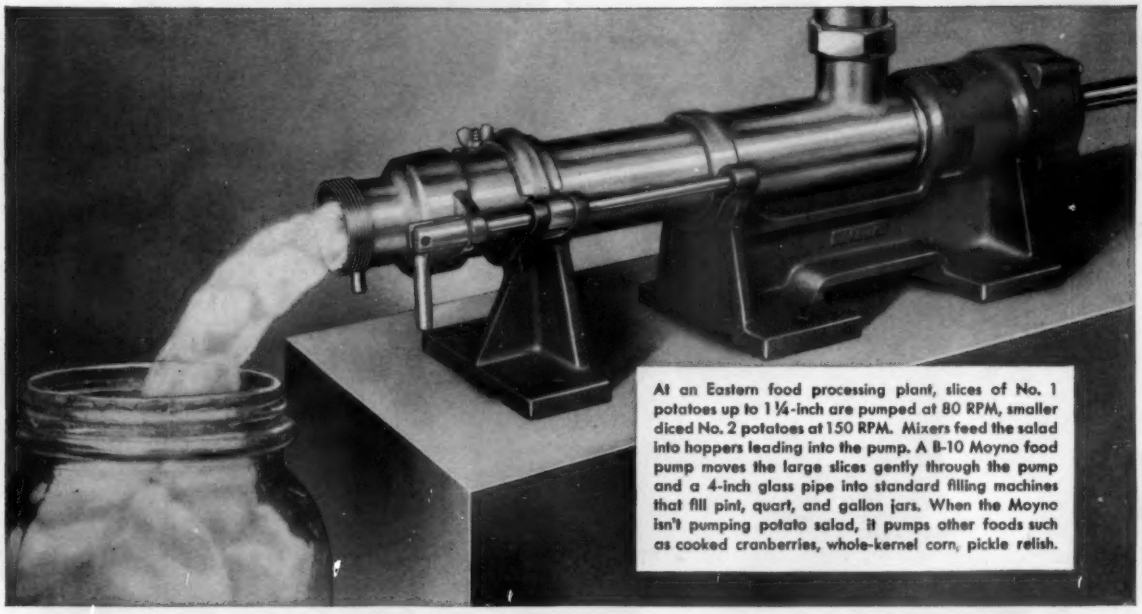
ERIE CITY
115 Years in Steam Generation

You can depend on Erie City for sound engineering

ERIE CITY IRON WORKS • *Erie, Pa.*

STEAM GENERATORS • SUPERHEATERS • ECONOMIZERS • AIR PREHEATERS
UNDERFEED AND SPREADER STOKERS • PULVERIZERS

For more facts circle 508 on Reply Card



At an Eastern food processing plant, slices of No. 1 potatoes up to 1¼-inch are pumped at 80 RPM, smaller diced No. 2 potatoes at 150 RPM. Mixers feed the salad into hoppers leading into the pump. A B-10 Moyno food pump moves the large slices gently through the pump and a 4-inch glass pipe into standard filling machines that fill pint, quart, and gallon jars. When the Moyno isn't pumping potato salad, it pumps other foods such as cooked cranberries, whole-kernel corn, pickle relish.

This Moyno® Pumps Potato Salad With Slices Up To 1¼-inch...Without Crushing!

The Moyno can pump potato salad and a lot of other materials without making mush out of them—because of the unique *progressing cavity* principle.

Moynos have no valves and pistons, no vanes or other devices that cause churning and turbulence. The Moyno has a simple screw-like rotor turning within a double-threaded stator. This design creates cavities which progress smoothly toward the discharge end of the pump, carrying the material being handled. The material is not squeezed or churned.

Pumps Practically Anything

That's why the Moyno successfully handles such hard-to-pump materials as non-pourable pastes, frits, plaster, highly volatile liquids, and materials containing large particles, such as potato salad, fruit, cherries, chow mein—even oysters! In fact, the Moyno handles practically anything that will pass through a pipe.

Many Other Advantages

Moynos pump many hard-to-pump materials with a minimum of abrasion and wear. Many plants have adopted Moynos simply because they last so long.

Moynos provide positive displacement. Moynos can pull up to 29 inches vacuum while discharging under pressure. Big Moynos deliver up to 500 gpm; can provide pressures up to 600 psi in the smaller frame sizes. They even get up to 1000 psi momentarily.

The Moyno is reversible—it pumps equally efficiently in either direction.

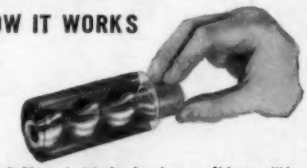
With the Moyno, accurately metered flows are obtainable by regulating operating speed.

Moynos are trouble-free. They are self priming; won't cavitate or vaporlock. There's just one moving part—no valves to stick, no pistons to gum up. Built for tough service. Easy to maintain. Moyno pumps are easy to take apart for cleaning.

Write For Bulletin

You may save a good deal of money or solve a tough problem by finding out about this simple, versatile pump. Write for Bulletin 30PE.

HOW IT WORKS



Rotor is like a stretched-out corkscrew. It turns within a stator that has a double internal thread. Thus rotor and stator form closely fitted cavities. As the rotor turns, these cavities progress evenly toward the discharge end of the pump without closing up. That's why the Moyno easily handles materials without crushing, churning, or aerating; and why it can handle so many different things—solids in suspension, pastes, abrasives, highly volatile liquids, tars, soaps, caustics—even cement and plaster.

FOR DESIGN ENGINEERS

Moynos are available in small sizes and special designs for use in automatic washers, drink dispensers, sprayers, oil burners, machine tools, gasoline pumps, and a wide variety of other equipment. If you are designing machinery, we'll work with you, in confidence, to integrate pump design with your problem.

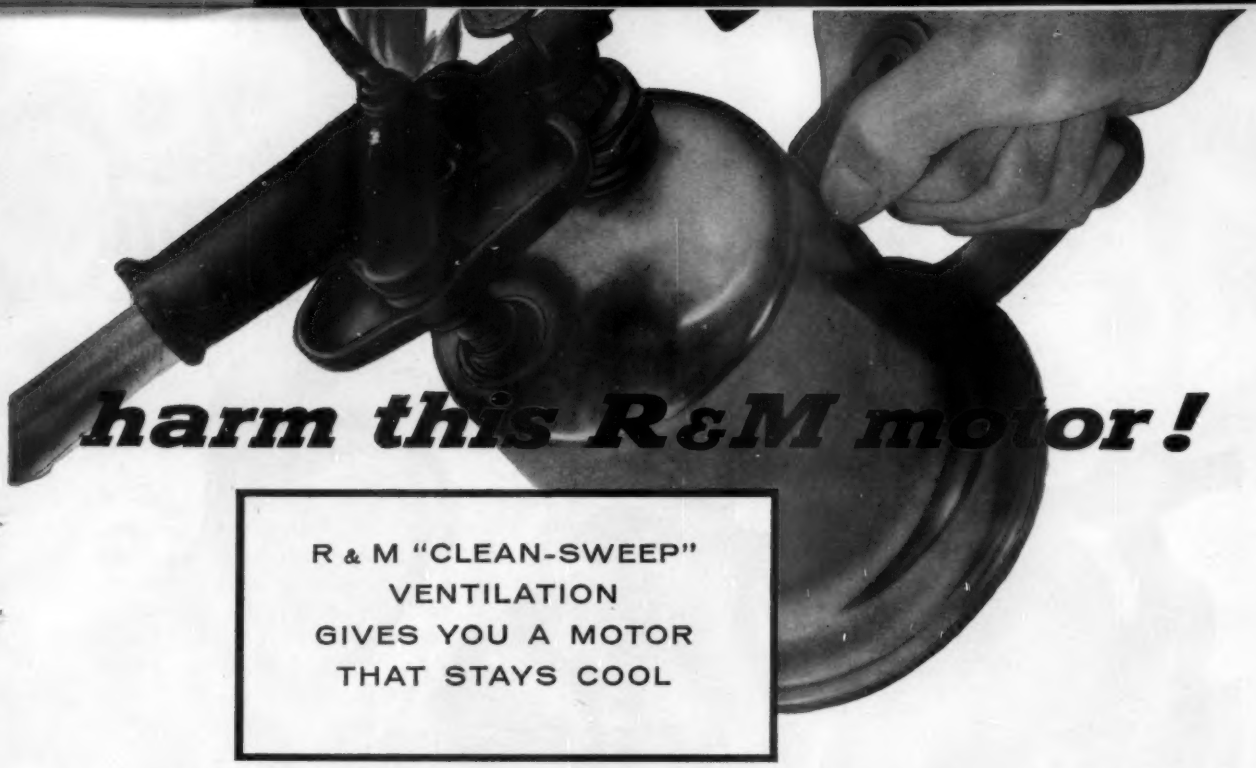
ROBBINS & MYERS, INC.

SPRINGFIELD, OHIO • BRANTFORD, ONTARIO

Fractional and Integral HP Motors | Desk, Window, and Household Fans | Hoists and Cranes | Moyno Pumps | Propellair Industrial Ventilating Equipment

For more facts circle 509 on Reply Card

Even the blast of a
blowtorch didn't



harm this R&M motor!

R & M "CLEAN-SWEEP"
VENTILATION
GIVES YOU A MOTOR
THAT STAYS COOL

To show how R & M motors shrug off heat, a standard R & M "All-Weather" Motor was run for two hours—with a blowtorch pointed directly at it. At the end of the test you could fry an egg on the shell in seconds; surface temperature was 298° F. But *inside*—where coolness counts—temperature stayed at 167° F. Winding and insulation remained in perfect condition!

There's an important moral to this test, even though you'd never subject a motor to such extreme heat in your plant. Overloads have the same effect on a motor; so does exposure to hot sun. R & M motors are designed to circulate air at unusually high velocity—from *one end clear through to the other end.* R & M "clean-sweep" ventilation not only carries off motor heat, but also prevents build-up of dust and dirt in the cooling passages. And for extra protection, openings are screened—at no extra cost to you.

A foundry in the midwest is one of many users who swear by R & M Motors because of "clean-sweep" ventilation. One of their motors has seen 11 years of service on a blast furnace charging crane. Hot work—but the R & M motor still runs perfectly! You can expect the same top-flight service in *your* plant.

ROBBINS & MYERS, INC.

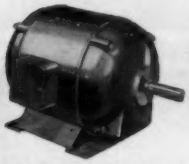
SPRINGFIELD 99, OHIO • BRANTFORD, ONTARIO

From 1 to 200 Horsepower...

if it's an R & M it's the Right Motor!

Explosion-proof totally enclosed fan-cooled 1 to 40 hp.

Frequency converters and alternators 2½ to 15 kw.



Direct current motors 1 to 7½ hp.

Capacitor single-phase motors 1 to 15 hp.

"All-Weather" is an R & M trademark

MAIL THE COUPON TODAY...
for more information on the finest motor your money can buy!

PE

Robbins & Myers, Inc., Springfield, Ohio

☐ Please send illustrated Integral Motor Catalog, showing all the extra features of R & M "All-Weather" Motors that are furnished at a standard motor price. We are also interested in:

☐ Explosion-Proof
☐ Totally Enclosed Fan-Cooled
☐ Capacitor Single Phase
☐ Frequency Converters & Alternators

*Name*_____ *Title*_____

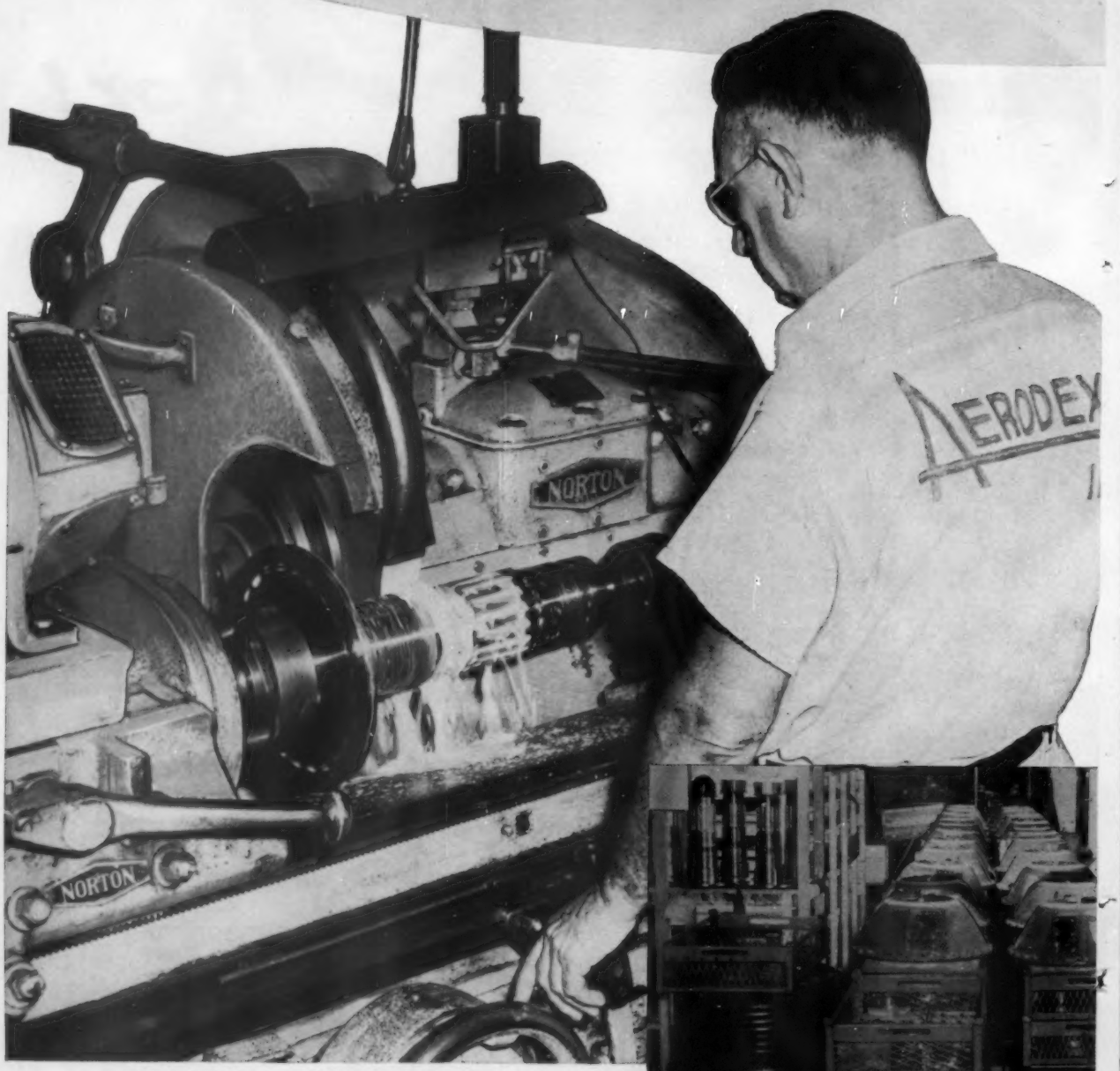
*Company*_____

*Address*_____

*City*_____ *Zone*_____ *State*_____

For more facts circle 510 on Reply Card

Gulf Products aid



Gulf Soluble Cutting Oil provides high cooling efficiency for this grinding operation on a propeller shaft.

A view of the material control area where the parts are stored in readiness for assembly after immersion in a tank of Gulf No-Rust FPR.

operations at Aerodex, Inc.

The world's most modern aircraft engine overhaul facility

By adapting mass production techniques to engine maintenance in the world's most modern engine overhaul shop at Miami, Fla., Aerodex, Inc. overhauls an engine with fewer man-hours than any other commercial organization. This represents a considerable saving to the Air Force, with whom Aerodex has large contracts, as well as to private concerns which send their engines in for overhaul.

Gulf products are used throughout the Aerodex shop to help speed their engine overhaul work. Gulf Lasupar Cutting Oil helps produce parts to extremely close tolerances with few tool changes in machining operations on many types of steel, while Gulf Soluble Cutting Oil provides high cooling efficiency for grinding operations. After machining, the parts are cleaned in a bath of Gulf Stoddard Solvent, then dipped in a tank of Gulf No-Rust FPR to protect polished metal surfaces against rust during temporary storage. Every engine is fueled and lubricated with Gulf Aviation Gasoline and Aviation Oil during the 3¾ hour test run after final assembly. And various other Gulf Quality Products help keep the auxiliary equipment required for a large operation of this type working smoothly and continuously.

You too will find, as did Aerodex, that there is a Gulf Product to fit your every need —quality oils and greases that can help you improve production and lower your maintenance costs.

Consult the telephone directory for the number of your nearest Gulf office, then contact a Gulf Sales Engineer for help on any problem that involves a petroleum product.

THE FINEST PETROLEUM PRODUCTS FOR ALL YOUR NEEDS

All engine parts are reworked, inspected and then sent to the material "hold" area, where they are immersed in Gulf No-Rust FPR. This quality rust preventive cleans the finely machined surfaces and protects them from rust during temporary storage.

GULF OIL CORPORATION
GULF REFINING COMPANY
1822 Gulf Building, Pittsburgh 30, Pa.

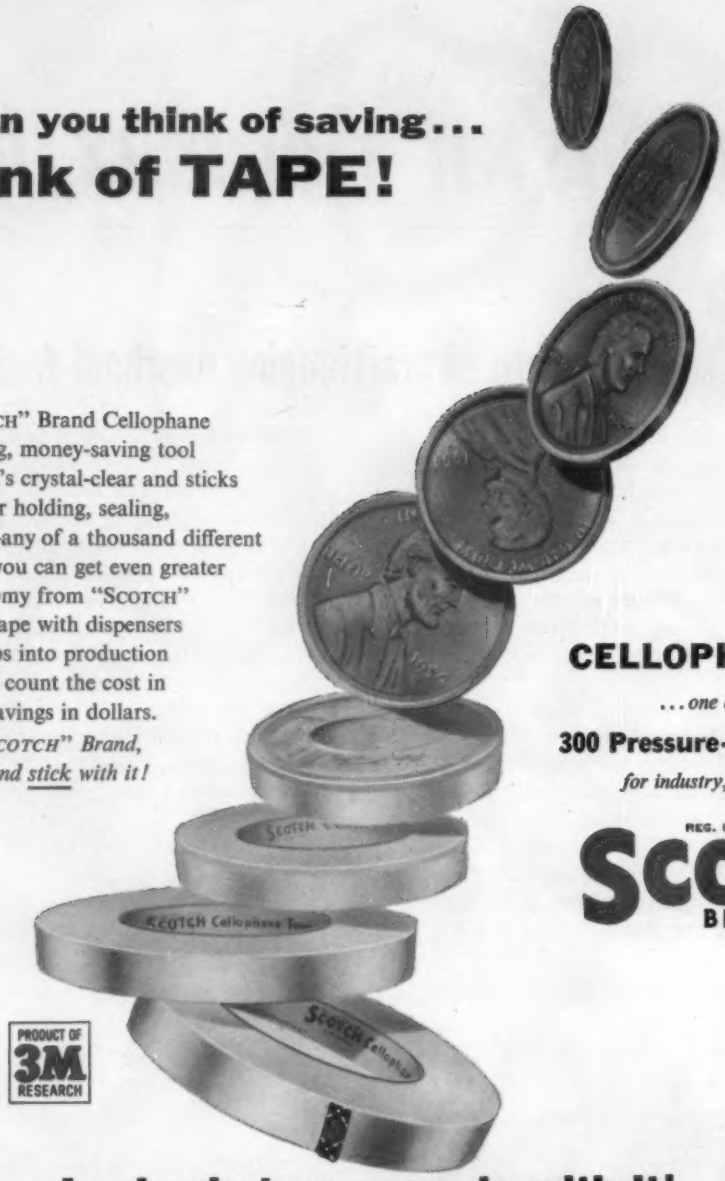
GULF

For more facts circle 511 on Reply Card

When you think of saving...
think of TAPE!

Famous "SCOTCH" Brand Cellophane Tape is a time-saving, money-saving tool all over the plant! It's crystal-clear and sticks at a touch. Use it for holding, sealing, joining, protecting—any of a thousand different jobs. What's more, you can get even greater versatility and economy from "SCOTCH" Brand Cellophane Tape with dispensers that turn manual jobs into production line operations. You count the cost in pennies; figure the savings in dollars.

Always specify "SCOTCH" Brand, the quality tape . . . and stick with it!



CELLOPHANE TAPE

. . . one of more than

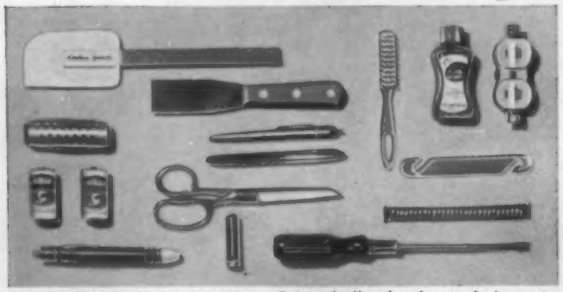
300 Pressure-Sensitive Tapes

for industry, trademarked . . .

REG. U.S. PAT. OFF.

SCOTCH
BRAND

Look what you can do with it!



IF YOU MAKE OR PACKAGE products similar in size and shape to these, you can card them quickly, easily, economically. New semi-automatic "SCOTCH" Brand Tape Stapler, using "SCOTCH" Brand Cellophane Tape, does it at production-line speeds—up to 80 items a minute. Tape "staples" will not scratch or mar surfaces.

TAPE STAPLED items, such as this lipstick tube, come out of machine fastened securely to card, which may be any size to allow for printed sales message.

SEND FOR information sheet describing Tape Stapler, with descriptive folder on "SCOTCH" Brand Cellophane Tape. Just write on your letterhead: Dept. FB-105.

The term "SCOTCH" is a registered trademark of Minnesota Mining and Manufacturing Co., St. Paul 6, Minn. Export Sales Office: 99 Park Ave., New York 16, N.Y. In Canada: P.O. Box 757, London, Ontario. © 3M Co., 1955.

For more facts circle 512 on Reply Card

For more facts circle 513 on Reply Card →

The Results of this Important Research Project are basic to every man who faces a Rust Problem

RUST-OLEUM
A CORPORATION
STOPS RUST!

CHICAGO · BRIARGATE 4-4000 · EVANSTON · GREENLEAF 5-4444
EVANSTON · ILLINOIS

IN REPLY PLEASE REFER TO FILE NO. 1

September 15, 1955

SUBJECT: Special Report to Industry

It is generally recognized by engineers and corrosion experts that there is far more to stopping rust on a rusted surface, than just applying any type of material at a certain film thickness. Dry film thickness of a protective coating is important--but, it's what goes on UNDER the film surface that counts, too. The vehicle of the coating that's applied over rust must penetrate to bare metal, driving out the air and moisture that, in presence of metal, cause rust.

Rust-Oleum users, for over thirty years, have known that Rust-Oleum does exactly that through practical use and results of the application of the product. However, Rust-Oleum wanted to go even further in bringing you irrefutable proof of this penetration.

With this in mind, the Rust-Oleum Corporation consulted with technologists from the Battelle Memorial Institute in Columbus, Ohio, who conducted this important research project, utilizing radioactive tracing technique with C-14 radioisotope to measure Rust-Oleum penetration. Now, after nearly three years of continued research, you can actually look UNDER the surface film and see how the Rust-Oleum penetrates rust to bare metal.

The methods and results of this research, which are outlined on the following pages, are given in their entirety in a thirty-page report entitled, "The Development of a Method to Determine The Degree of Penetration of a Rust-Oleum Fish-Oil-Based Coating Into Rust Coatings on Steel Specimens," prepared by Battelle Memorial Institute technologists. It is available to you without cost or obligation by request on your business letterhead.

Very truly yours,

RUST-OLEUM

Robert A

President

RAF/jc

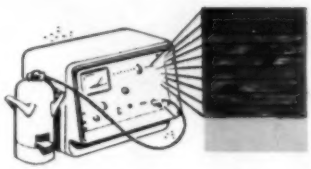
Now! For the first time, actually look *under* the surface of the coating! See Rust-Oleum *penetrate rust* to bare metal through the "eyes" of radioactivity!

(A RUST-OLEUM REPORT TO EVERY PERSON FACED WITH A RUST PROBLEM)

Nearly three years of research, utilizing radioactive tracing with C^{14} radioisotope, enables you to follow Rust-Oleum penetration through the heretofore "unseen" rust area to bare metal. While Rust-Oleum users, for over thirty years, have known that Rust-Oleum penetrates rust to bare metal when applied over rusted surfaces—Rust-Oleum wanted to go even further in bringing irrefutable evidence of this penetration to you. The methods and results, on which the technical information on these pages is largely based, are presented in a complete thirty page report entitled, "The Development of a Method to Determine The Degree of Penetration of a Rust-Oleum Fish-Oil-Based Coating Into Rust Coatings on Steel Specimens," prepared by Battelle Memorial Institute technologists. Request your copy on your business letterhead without cost or obligation.

1 To trace Rust-Oleum penetration through rust, the Rust-Oleum fish oil vehicle was made radioactive with C^{14} radioisotope. The radioactive Rust-Oleum fish oil vehicle was then formulated into Rust-Oleum 769 Damp-Proof Red Primer without changing Rust-Oleum's exclusive formulation or performance of product.

2 Rusted metal test panels were scraped and wirebrushed to remove rust scale and loose rust, according to Rust-Oleum's standard directions for application. The radioactive Rust-Oleum 769 Damp-Proof Red Primer was then brushed on directly over the remaining rust on these rusted test panels and allowed to dry.



3 Then—the surfaces of the rusted panels were shaved at approximate half-mil levels and Geiger Counter readings of Rust-Oleum penetration (radioactivity) were taken at each level down to bare metal. These measurements are shown as "Percentage of Surface Radioactivity" figures on the graph on the opposite page.

Dry film thickness of a coating is important, but, what goes on UNDER the film surface is vitally important, too, in the stopping of rust. Rust-Oleum Stops Rust, because it penetrates the rust to bare metal. The Rust-Oleum fish oil vehicle works around the rust particles and through the fissures and crevices in the rust formation to the bare metal. It doesn't "bridge-over" the tiny, microscopic pits in the metal—BUT, actually goes into these pits to drive out air and moisture and coat the metal with a penetrating, low-surface-tension film that expands and contracts with the metal. Because of this unusual penetration, you can apply Rust-Oleum 769 Damp-Proof Red Primer directly over the rusted surface after scraping and wirebrushing to remove rust scale and loose rust. Thus—you save time, labor, and money as costly surface preparations are usually eliminated.

From tanks, girders, machinery, roofs, sash, stacks, pipes, wire fences, and building maintenance in industry . . . marine, farm, or railroad applications . . . to gutters, metal sash, lawn furniture, etc. around the home . . . Rust-Oleum is the modern way to Stop Rust and beautify as you protect, in your choice of Red, White, Black, Aluminum, Gray, Green, Yellow, Blue, etc. May be applied by brush or spray and dries to a firm, *decorative* coating that resists salt water, salt air, heat, fumes, sun, humidity, and weathering. Industrial users see Sweets for complete catalog and nearest Rust-Oleum Distributor, or attach coupon on the opposite page to your business letterhead for complete information, including your thirty-page report on Rust-Oleum penetration. Homeowners will find Rust-Oleum featured at leading Hardware, Paint, and Lumber dealers in most localities.

there is only one Rust-Oleum . . . *it is distinctive as your own fingerprint*

RUST-OLEUM®

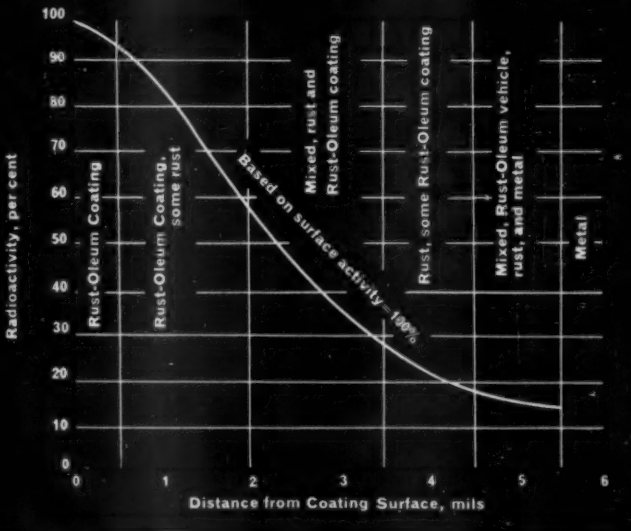
Rust-Oleum is exclusive. It incorporates a specially-processed fish oil vehicle that penetrates through rust to bare metal. It dries right and is free of objectionable odor. Many attractive colors.

STOPS RUST!

A new Rust-Oleum development is the Rust-Oleum Galvinoleum coating. It sticks to new or old galvanized surfaces *without* etching, *without* weathering. Available in red, gray, green, metallic.

Actual unretouched photomicrograph (enlarged 250 times) showing cross-section of rusted metal coated with Rust-Oleum. Geiger Counter readings were taken at each half-mil level down through the rust—tracing Rust-Oleum penetration through rust to bare metal.

Graph (at right) shows Geiger Counter recordings of Rust-Oleum penetration. Visible evidence of Rust-Oleum penetration as recorded by Geiger Counter and Gas Flow Proportional Counter is shown on graph. Rust-Oleum penetration is expressed in terms of "Percentage of Surface Radioactivity" figures at given mil levels. Note how Rust-Oleum pigment and fish oil vehicle combined penetrate to approximately four mils—then the fish oil vehicle penetrates through remaining rust to bare metal.



GET THE COMPLETE STORY. ATTACH TO YOUR BUSINESS LETTERHEAD FOR YOUR COPY OF THIS THIRTY-PAGE REPORT WITHOUT COST OR OBLIGATION.

Rust-Oleum Corporation
2980 Oakton Street, Evanston, Illinois

- ☐ Please send me without cost or obligation, the Rust-Oleum thirty-page report entitled, "The Development of a Method To Determine The Degree of Penetration of a Rust-Oleum Fish-Oil-Based Coating Into Rust Coatings On Steel Specimens," as prepared by Battelle Memorial Institute technologists.
- ☐ Complete literature and color charts.
- ☐ Nearest source of supply.

...there is only one Rust-Oleum...it is distinctive as your own fingerprint

RUST-OLEUM IS EXCLUSIVE. Most manufacturers of protective materials specify that rusted metal surfaces must be free of rust before applying their product. Rust-Oleum does NOT! With Rust-Oleum you simply scrape and wirebrush to remove rust scale and loose rust —then brush Rust-Oleum 769 Damp-Proof Red Primer directly over the remaining rust. The specially-processed fish oil vehicle penetrates rust to bare metal, merging the rust particles into the coating. It dries to a firm, decorative coating that resists salt water, salt air, heat, fumes, humidity, sun, moisture, and weathering. This unusual penetration saves you time, labor, money, and metal because sandblasting, chemical pre-cleaning, and other costly surface preparations are usually eliminated.

AVAILABLE IN *MANY COLORS.* You beautify as you protect because Rust-Oleum is available in many, many attractive colors including Aluminum, White, Black, Green, Red, Gray, Orange, Yellow, Blue, etc. In addition to industrial rust preventive coatings, Rust-Oleum finish coatings, incorporating the same specially-processed fish oil vehicle, are available (1) to match original equipment manufacturer's colors for farm and road and highway construction equipment, (2) Oil Field finishes to match original equipment colors for rigs, pumps, etc., (3) Restful Colors for plant and institutional interiors, (4) Special Marine and Railroad finishes, (5) Heat Resistant and Chemical Resistant finishes, (6) Masonry and Floor Coatings.

RUST-OLEUM®

Remember—Rust-Oleum's unusual rust-resistant qualities enable you to apply Rust-Oleum 769 Damp-Proof Red Primer one season—and wait until the following season to use your Rust-Oleum finish coating. Thus—you "stretch" maintenance budgets season-to-season.

STOPS RUST!

Write on your business letterhead for your copy of the special Rust-Oleum thirty-page report, entitled, "The Development of a Method to Determine The Degree of Penetration of a Rust-Oleum Fish-Oil-Based Coating Into Rust Coatings on Steel Specimens." We'll be glad to send it to you promptly, and there is no cost or obligation.

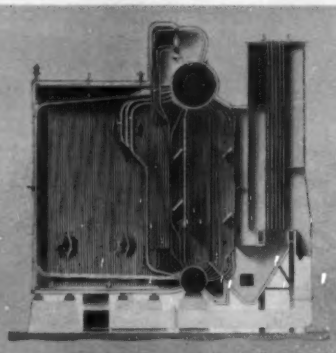
Rust-Oleum Corporation • 2980 Oakton Street • Evanston, Illinois

one of these C-E standard boilers is . . . .

DESIGNED FOR YOUR PLANT

If your steam needs range between 4,000 and 120,000 pounds per hour, one of these versatile C-E Boilers will give you economical, standout performance. For while they are standard in design (which means lower first cost and proven performance), they're still *flexible* enough to be easily adapted to meet almost any standard requirement.

Chances are that one of the C-E standard boilers is the answer to your steam needs. But whatever they may be, C-E can fill them. For C-E Boilers are made in sizes and types for *any* capacity—for *any* pressure—*any* fuel or method of firing.

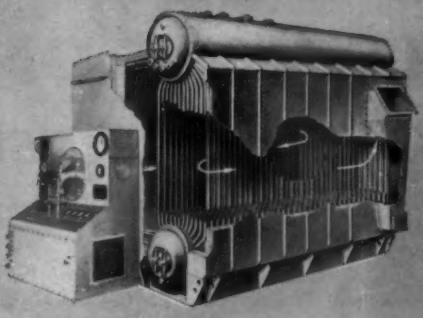


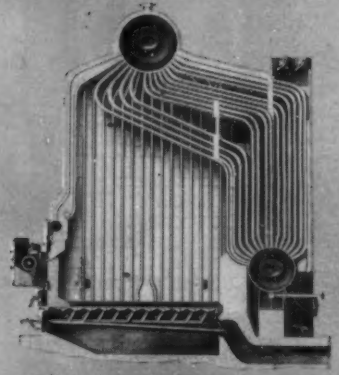
C-E Vertical Unit Boiler, Type VU-55

The VU-55 Boiler is available in six sizes ranging from 50,000 to 120,000 lb of steam per hr. It is designed for two pressure ranges—up to 250 psig and to 500 psig. These units are arranged for the application of superheater surface and heat recovery equipment if desired. VU-55 Boilers are designed for the pressure firing of oil or gaseous fuel and require no induced draft fan. They are equipped with tangential burners and tangent tube furnace walls to assure a level of performance which compares favorably with modern utility practice. The VU-55 Boiler is bottom supported requiring no supporting steel structure. The absence of exterior ductwork permits a smooth, streamlined exterior which is both attractive and practical.

C-E Package Boiler, Type VP

This completely shop-assembled boiler is available in fourteen sizes from 4,000 to 40,000 pounds of steam per hour . . . for operating pressures up to 500 psi . . . for pressure firing of liquid or gaseous fuels. The VP Boiler has more water-cooled area per cubic foot of furnace volume than any other boiler of its size and type. The large lower drum—30-inch diameter—permits a simple, symmetrical tube arrangement . . . greater water storage capacity . . . easy access for washing down or inspection. A centrifugal fan, which operates at low speed and is exceptionally quiet in operation, is standard equipment. The simple baffle arrangement results in low draft loss . . . simple soot blowing . . . no dead pockets . . . high heat absorption. The VP is enclosed in a reinforced gas-tight, welded steel casing, and shipped completely assembled with firing equipment, fittings and forced draft fan. For foundation, it needs only a simple concrete slab.





C-E Vertical Unit Boiler, Type VU-10

The VU-10 is available in nine sizes from 10,000 to 60,000 pounds of steam per hour . . . for operating pressures up to 475 psi . . . superheat to 200° F in 20,000-60,000 lb range . . . for solid, liquid, or gaseous fuels. This boiler is a completely standardized design adaptable to many conditions. It is bottom-supported and needs no outside supporting steel. It operates efficiently over a wide range of output, and is easy to operate and to maintain. All parts are easily accessible for inspection. The VU-10 is a complete unit—boiler, furnace, setting, fuel-burning equipment, controls, forced draft, heat recovery equipment (if desired). Regardless of fuel, the same general cross-sectional arrangement of drums, convection bank and furnace wall cooling is used. Uniform design through each transverse section assures even water level in the drum and uniform expansion.

A C-E Industrial Boiler for Every Need—Combustion Boilers are available in many other 2-drum designs—for capacities up to 350,000 pounds of steam per hour—and to burn any commercially available fuel. All of these boilers can be designed for use with pressures up to 1375 psi and steam temperatures as high as 960 F—utilize any type of heat recovery equipment—fit difficult space conditions. Let us give you full details on the complete line of C-E Industrial Boilers, including the C-E LaMont Controlled Circulation Hot Water Boilers. 8-852A

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CANADA: COMBUSTION ENGINEERING-SUPERHEATER LTD.

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C-E

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THE HEAT'S ON
...and fast!

YARWAY Impulse Steam Traps get equipment hot in a hurry, and *keep* it hot.

As soon as steam is turned on—SNAP—the little stainless steel valve opens wide, discharges condensate and air *continuously* until steam arrives. Then—SNAP—the valve shuts. Equipment reaches operating temperature in the shortest possible time.

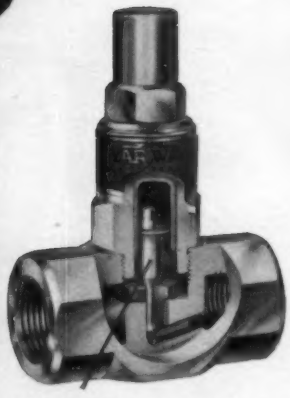
After that the little valve actually *floats on the condensate load*—maintains peak temperatures.

Other YARWAY features:

- **Stainless steel—body and internal parts.**
- **Good for all pressures without change of valve or seat.**
- **Low maintenance—one moving part.**
- **Easy installation—small size, light weight.**
- **Non-freezing at low temperatures.**
- **Six standard sizes, ½" to 2".**

Want *proof* of performance? Try a YARWAY Impulse Trap and Fine Screen Strainer FREE for 90 days in your own plant. For free trial, or free catalog, write . . .

YARNALL-WARING COMPANY
145 Mermaid Ave., Philadelphia 18, Pa.



This little valve—only moving part in a YARWAY Impulse Steam Trap—*floats on the condensate load*. It gets equipment hot in a hurry and keeps it hot!

YARWAY
impulse steam trap

OVER 1,000,000 YARWAY IMPULSE TRAPS SOLD—STOCKED BY 270 CONVENIENT INDUSTRIAL DISTRIBUTORS

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BULLETINS just released and of immediate plant interest

On pages 235-236 are two postage-free Reader Service Cards provided for your convenience in ordering these bulletins. You may also use the cards to order any literature mentioned in ads.

CONSTRUCTION

101 Ideas for Framing—Some 38 installations of Dexion slotted angle framing are pictured in this brochure. Advantages and features of this easily erected, inexpensive and reusable steel framing material are discussed and three types available are shown. Uses shown include supports for overhead conveyors, storage racks, electrical mounting, work benches, pallets and many others covering a wide range of industries. Acme Steel Co.

102 Stud Driver Economies—This booklet provides a 17-pp economic evaluation of the Model 450 Remington stud driver. Summarizes economies which can be achieved by use of this powder actuated driver in construction fastenings. Compares this and other types of fastening methods in steel-to-steel, wood-to-steel, steel to concrete, wood to concrete fastenings. Includes conclusions based on data presented indicating time saving advantages of the tool, when its purchase is justified, variables which increase its economic advantage. Remington Arms Co., Inc.

103 For Better Masonry—The advantages of a mortar cement affording superior mortar characteristics and performance are outlined in this 24-pp bulletin. Quality control methods used to achieve and maintain uniformly high product performance are illustrated. Recommended practice covering materials, proportioning, mixing, laying of units and reference tables are included. Universal Atlas Cement Co.

104 Shelving, Wall Sections—Bulletins D-1, 2, 3 demonstrate company's adjustable metal framing system for use on shelving, wall sections. Folders graphically show construction advantages, and tell how system has been used in combination with plywood, glass, perforated-board, hardboard and similar building materials. Details of frame construction, parts and fittings used and suggested covering materials are included. Unistrut Products Co.

105 Thin Wall Construction—Use of thin wall sections to cut construction costs and increase usable floor space is discussed in Bulletin CA-18. Stresses safety, light weight, fast erection, other advantages afforded by using thin wall sections of vermiculite concrete in spandrel, panel and curtain wall construction. Zonolite Co.

106 Suspension Ceiling — Flexibility that permits moving lights and other ceiling fixtures in acoustical tile ceilings is described as one of the chief advantages of company's suspension system in this illustrated brochure. Design and construction features are pointed out, specifications listed. Accesso Systems, Inc.

VALVES, PIPING, FITTINGS

108 Union Bonnet Valves—Illustrated Form 1006 describes union bonnet bronze gate valves. Specifications, general dimensions, service recommendations and design details are provided. The Ohio Injector Co.

109 For Corrosive Service—Circular 592 describes and illustrates Causul metal gate valves for corrosive service. Provides dimension and application tables. Design details are shown. The Lunkenheimer Co.

110 Water Valves — Manually operated water valves, 0 to 6000 psi, are cataloged in this illustrated bulletin. Ordering data and valve characteristics are given on standard, manifold porting and tandem mounting four-way types, manipulators and shut-offs. Barksdale Valves.

111 Laminated Pipe—Bulletin FTL-1 on company's line of laminated fluorocarbon resin pipe describes physical and chemical properties, includes piping specifications, a detailed description of flanging and coupling pipe in the field with a special tool, as well as suggested applications for the chemically inert plastic pipe. Latest price list is inserted in bulletin. Resistoflex Corp.

112 Diaphragm Valves—Specification Sheet 429 covers company's line of diaphragm control valves, designated Series 400. Data include actuator and body specifications, flow characteristics and complete dimensions for the double-seated, single-seated and three-way types which comprise the new line. Minneapolis-Honeywell Regulator Co.

113 Threadless Fittings—Described in 8-pp Price List D are malleable iron threadless fittings for joining steel or plastic pipe. Typical uses are illustrated and size and price data given for couplings, adapters, elbows, tees. Advantages of the threadless fittings are discussed. Telsco Fittings Div.

114 Tube Fittings—Twelve-pp Catalog 4324 presents a line of flareless type fittings especially for instrumentation lines. Elbows, unions, crosses, tees, reducers and ferrules are pictured and dimensions given. Fittings for use with plastic tubing are also included in this catalog. The Parker Appliance Co.

115 High-Flow Coupling—Bulletin 230 outlines the advantages of company's quick-connect disconnect Hi-Flow Coupling. Discusses uses and construction, includes a fully-detailed cut-away of coupling, lists dimensions and gives ordering information. Snap-Tite, Inc.

116 For Corrosion Protection—How to get greater coverage from protective coating at lower costs in safe-guarding pipe, pipe joints, fittings and couplings is described in this illustrated brochure. Covers the story of Tapecoat-X, a coal tar coating in tape form which is made with an extra thickness of coal tar to provide double-wrap protection from single-wrap application. A table covers application data. Tapecoat Co.

117 For Pipeline Protection — Applications and property data on tape products for pipeline protection are presented in this 16-pp illustrated bulletin. Covers use of Scotchrap brand all-weather pipe wrap tapes, pipe primer, and filament No. 45 for attaching rock shields to buried pipe. In addition, it covers Scotchfil electrical insulation putty, Scotch plastic tape, and Scotchkote electrical coating for protection of splices in anode ground bed installations where resistance to moisture, fungus and mechanical abrasion is required. Charts showing physical and electrical insulating properties for each of the products are included. Minnesota Mining and Mfg. Co.

MECHANICAL POWER TRANSMISSION

119 Variable Speed Drives—Eight-pp Form 188, on Speed-Trol variable speed drives, explains how a positively adjusted pulley linkage maintains speed and transmits full horsepower in these drives. Engineering features of the drives are discussed and remote controls available are described and pictured. Bulletin also provides selection tips on these drives which come in a wide range of ratings and speeds. Sterling Electric Motors, Inc.

120 Friction Clutches—Eight-pp Book 2637 describes company's improved friction clutch for power transmission applications, especially suited for applications where increased speeds prohibit use of jaw clutches and where gradual pickup is a must. Illustrates and discusses application for each of three types—mounting sleeve, mounting ring and coupling. Besides describing operation, book contains horsepower and dimension tables and full instruction for selecting correct clutch. Link-Belt Co.

121 Rolling Bearings—Bulletin A-638, 52 pp, features company's line of ball bearing pillow blocks, and flange cartridge mounts, as well as technical information and list prices on complete line of ball and roller bearings. Tabular data includes engineering drawings, dimensions, shaft sizes, weights, radial load ratings and list prices. Product illustrations, including cutaway views showing inner construction are included and typical applications shown. Dodge Mfg. Corp.

ELECTRICAL

123 Electrical Insulations — This revised general catalog of flexible insulation materials is a compilation of technical data sheets. Products included are grouped in three categories: coated products, varnishes and plastic products. Also provided are many useful charts and conversion tables, purchasing information and a list of sales representatives in U. S. cities. Catalog comes in a loose-leaf binder so additional sheets may be added. Available to qualified plant engineers, please state your job title when requesting this catalog. Irvington Varnish & Insulator, Div., Minnesota Mining & Mfg. Co.

124 Making Cable Joints—Complete, step-by-step pictorial directions for making all types of cable joints in company's Neoprene-jacketed Durasheath cables are contained in this pocket-size 12-pp booklet. Booklet tells its story in photos supplemented by simple instructions. Anaconda Wire & Cable Co.

125 Aluminum Bus Bars—The use of aluminum bus bars in both feeder and plug-in or trolley busway distribution systems is described in 8-pp Bulletin GEA-6169. Lists advantages in using aluminum as a conductor in busway applications, and includes construction features, operating characteristics, and specifications. General Electric Co.

126 Enclosed Switches—Catalog 83, 28-pp, describes in detail the wide variety of enclosed industrial applications. Included are general switches designed for use on either a-c or d-c purpose switches, sealed switches, heavy-duty limit switches, hand operated switches, and maintained-contact switches, all of which are available in a variety of actuator designs, contact arrangements and electrical ratings. Photos, dimensional drawings, circuit diagrams, electrical data are included. Micro Switch, Div., Minneapolis-Honeywell Regulator Co.

127 Electronic System Capacitors—Ten-pp Publication GED-2620 presents basic characteristics of specialty capacitors for the electronics industry. Tantalytic capacitors, subminiature metal-clad tubular capacitors, drawn-oval capacitors, energy storage and discharge capacitors are among types catalogued. Application suggestions, ratings, capacitance tolerances, temperature ranges and characteristics are given. General Electric Co.

128 For Emergency Lighting—Diagrams, charts and specifications useful in planning emergency lighting installations are contained in this 8-pp catalog, Form 5736, describing company's Lightguards—battery-powered emergency lighting equipment. Models designed for permanent connection, auxiliary lighting equipment (plug-in type) and a transparent plastic-cased battery are covered. Lightguard Models M, T, ME, and TE, together with type 3-COE-7 emergency lighting battery used in meeting rooms, passageways, institutions, control centers are described. Exide Industrial Div., The Electric Storage Battery Co.

PUMPS, COMPRESSORS

130 Two Stage Pumps—Bulletin 52B6105C describes two stage pumps for boiler feed and other high pressure uses available in close-coupled and frame type construction in capacities to 300 gpm heads of 300 to 550 ft at temperatures to 250 F. Dimensions and performance charts on the pumps are included. Allis-Chalmers Mfg. Co.

131 Proportioning Pump — Application Memo B-I-F M-37 discusses the continuous proportioning of chemicals into boiler feed water to increase safety, to prevent corrosion and accumulations of boiler tube sludge and scale, and to reduce costs and lost time from shutdowns. Bulletin shows one boiler treat-

BULLETINS

(Begins on page 23)

ment installation using six Adjust-O-Feeder proportioning pumps. Proportioneers, Inc.

132 Compressor Data—Feather valve compressors from 75 to 350 hp are described in 32-pp Bulletin L-676-B1A. Advantages on installation, operation and maintenance costs are outlined for types YC and DYC compressors. Information and illustrations are offered on component parts including frame, running gear parts, intercooler, crosshead, motor and main bearings and various cut-away views are included. Variable capacity control information is listed along with data on governors. Diagram illustrates correct selection and coordination of auxiliary equipment in typical installation. Worthington Corp.

WELDING AND MACHINE SHOP EQUIPMENT

134 Welding Equipment—Sixteen-pp Catalog 2350 describes and illustrates equipment for Aircomatic (an inert-gas-shielded metal arc welding process) welding. Manual and automatic units as well as accessory apparatus and welding wire covered. Air Reduction Sales Co.

135 On Welding Alloys—This 32-pp pocket-size booklet serves as a buyer's guide to this company's alloys and fluxes and includes data on 15 alloys not catalogued in previous issues. A case in point is a new classification for work on Monel with recommendations for brazing and newly introduced nickel-copper electrode. Also catalogued for the first time, is company's Jet Flux system, an automatic fluxing system which melds smoothly into production and maintenance brazing operations. All-State Welding Alloys Co., Inc.

136 Improved Spot Welder—Eight-pp Bulletin 334-3 describes an air operated press type spot welder, explaining in detail the three-phase Modu-Wave principle of operation of this unit. Design and operational advantages of the welder are discussed, and photos, drawings and tabular data are provided. Sciaky Bros., Inc.

137 Wheel Dressers—Fully illustrated, this 10-pp bulletin on Fluidmotion wheel dressers, covers procedure for forming wheels to shape on internal, cylindrical and surface grinders and tool and cutter grinders. The Fluidmotion feature which permits dressing two angles tangent to a radius in one continuous motion is explained. Specifications are provided along with operating tips. J&S Tool Co., Inc.

138 Rod Parter Manual—This 14-pp booklet is offered as a guide to aid in selecting and operating Di-Acro rod parters. Shows how these rod parters cut round, square, rectangular and hexagon bar stock without rough edges. Discusses types of stock which can be parted. Lists specifications and capacities on both hand and power operated models. Also provides full operating, lubricating and maintenance instructions. O'Neil-Irwin Mfg. Co.

HEATING

140 For Immersion Heating — Bulletin H-11, on immersion heating equipment, contains data on selection, sizing and installation of equipment, heat loss. Burner selection tables (eductor and atmospheric), and eductor air requirements are included. Eclipse Fuel Engineering Co.

141 Heating Plating Solutions—Bulletin 750 describes and illustrates a wide range of electric heaters for the heating of cleaning, pickling and plating solutions. Types for mounting through tank walls, side arm mounting, side hung immersion heaters and other types are shown. Also discussed are advantages of selective electric heat. Edwin L. Wiegand Co.

142 On Hot Water Heating — This 8-pp semi-technical bulletin (No. 923) spells out the nature of problems involved in "big swing" hot water loads and explains why many storage type systems are inherently unable to solve these problems. Bulletin concludes with a discussion of the Iso-Therm system as a solution to the problems of large scale industrial hot water heating. Fuel savings and other advantages offered by this system are also explained in detail. Fred H. Schaub Engineering Co.

143 Heat Transfer Apparatus — Condensed Bulletin HT-1 highlights representative products in company's line of heat transfer equipment. Includes oil heaters and coolers, strainers, evaporators, heat exchangers, radiafin air coolers, tubes, pipes, and coils. Cross-section views of typical units are shown, brief descriptions given, and references to other bulletins are listed. Schutte and Koerting Co.

WATER CONDITIONING

145 If You Use Water—The varied aspects of water conditioning are detailed in this well-organized 24-pp booklet. Discusses ion exchange resins and water softening by ion exchange; reduction of alkalinity; dionization including silica removal; removal of fluorides; special applications of ion exchange resins, such as conversion of salts, removal of acids, several others. The Resinous Products Div., Rohm & Haas Co.

146 Cooling Water Treatment—The chemical treatment of industrial cooling water is discussed in this bulletin. Some aspects of cooling water problems—scale and corrosion prevention, algae and slime control—are detailed. How water treatment problems are solved by means of both open and closed cooling systems are explained. Also included is application information on company's algaecide. Western Chemical Co.

MATERIALS HANDLING

148 Roller Conveyors — Catalog 60A, 20 pp, contains engineering data on medium and heavy duty roller conveyors, including specifications and capacities on rollers and bearings. Heavy duty mobile unit for straight sections of roller conveyor is illustrated, also roller curves, spur sections, sliding switches, converging sections, vertical lift and horizontal gate sections in permanent and portable types. Installation views are included. The E. W. Buschman Co.

149 Broad Visibility Truck—Operating advantages of the Monomast lift truck, a single mast design offering panoramic visibility, are shown in 6-pp Form 1402. Photos illustrate how unobstructed vision to load and forks results in faster, safer work output with minimum driver fatigue. Specifications provided. The Hyster Co.

150 On Bucket Cranes — Eight-pp Form 2510 contains an illustrated technical article intended to enable users of overhead traveling bucket cranes to obtain maximum cable life and top performance from clamshells. Photos and diagrams show relationship between preferred or required direction of bucket opening; location and contours of the piles of material, and position of the holding and closing drums in the trolley. Blaw-Knox Co.

You'll save time in ordering Bulletins by using the Reader Service Cards provided on pages 235-236. Of course, we honor letterhead requests—but it takes us a bit longer to handle them.

151 For Automatic Palletizing — Engineering, construction and operating details of the Lock-Load palletizer series 406000 are given in this illustrated bulletin. Shows how it palletizes cases in interlocking patterns—up to 36 a minute—onto wood or paper pallets. Includes general specifications. Food Machinery and Chemical Corp.

152 Pallet Loader—Operation of the Locke pallet loader is explained and illustrated in this folder. Features of the semi-automatic loader are given and a floor plan layout is sketched. Production Devices, Inc.

153 Sheet Steel Grabs—The advantages of company's line of grabs for the steel industry, in ½- to 50-ton capacities, and operated by hand or motor, are outlined in this illustrated brochure. Describes special features, operating mechanism, and includes dimensions and capacities. Mansaver Industries, Inc.

154 Wire Rope Assemblies—The complete range of company's Tru-Loc fittings and wire rope assemblies is covered in 24-pp Catalog TL-500. Shows possible combinations of fittings and assemblies, and includes necessary reference charts, tables, drawings. One section is devoted to special wire rope assemblies which company is prepared to manufacture to meet certain requirements or new applications. Illustrates yokes, sleeves, eyes, hooks, buttons, balls. American Chain & Cable Co., Inc.

155 Conveyor Belting Chart—Proper selection and maintenance of conveyor belting can be achieved with the aid of this 23 by 33 in. wall chart, which offers 12 practical maintenance tips for getting more life out of belts. Deals with storage of belts, correct design of loading chutes, use of automatic switches, lubrication, inspection. Also lists types of belt recommended for various applications, such as mining, metal processing, food processing, chemicals, coal handling. Hewitt-Robins, Inc.

AIR CONDITIONING

156 Air Conditioning Equipment—Bulletin 4001 describes and illustrates company's line of special and standard air conditioning and refrigeration equipment. Descriptions of dry expansion Freon and storage coolers, condensers, and slug eliminator and balance loader are included. Photos and piping diagrams illustrate text. The Patterson-Kelley Co., Inc.

157 Unit Air Conditioning — Diaflo unit conditioners for summer cooling and winter heating in multi-room structures are described in Bulletin 8227. Operation, construction and design features are described and illustrated. Also provided are installation drawings giving dimensions for five sizes available, other pertinent engineering data. American Blower Corp.

158 Air Conditioning Systems—Text of a talk about air conditioning systems for multi-story buildings is reprinted in booklet form, Booklet RP-598, reviewing various types of air-circulation systems employed today, their method of operation, advantages and disadvantages. Line drawings, cut-away views and photos illustrate text. Worthington Corp.

STEAM GENERATORS

159 Standard Generators — Bulletin B-55-4 describes company's SC economy series of standard steam generators designed to reduce steam costs for industrial plants. Pre-engineered, standardized steam generators offered in nine sizes, with capacities of from 50,000 to 150,000 lb per hour are described, and schematic and cutaway drawings of the units and design features are included. Foster Wheeler Corp.

160 Packaged Generators—This 16-pp catalog covers a new series of packaged steam generators in sizes from 10,000 to 46,000 lb of steam per hour. Gives capacities, dimensions, construction features. Instrumentation is discussed. Illustrations include sectional drawings and installation photos. Booklet also provides a selection chart on firing equipment and controls. Foster Wheeler Corp.

METALS, ALLOYS

161 Publication List — This 16-pp pocket-size folder lists all of the company's 85 current technical data sheets and booklets. Stainless, electrical, tool and die steels, and other high alloy specialties are covered. Allegheny Ludlum Steel Corp.

162 High Cast Alloys—To aid in the use of heat resistant cast alloys, this 5-pp illustrated article defines various grades and their general fields of applications and discusses the significance of elevated temperature tests. Creep strength and rupture strengths are given for each grade of alloy discussed in the article. Alloy Casting Institute.

(More Bulletins on page 237)

YOU GET BIG COMPRESSOR ADVANTAGES...

UNEQUALLED DURABILITY!

TRULY CONTINUOUS SERVICE!

...in this SMALL HEAVY DUTY JOY WG-9

The Joy WG-9 was designed to give a moderate (up to 881 CFM) but *continuous* air supply. It is suited for use both as a main air supply for smaller requirements, and as an auxiliary, or decentralized, air source in larger plants.

Heavy duty service is assured through these many "big compressor" advantages, including exclusive features not found in any other units available for comparable service:

- Water cooled for continuous operation, greatest efficiency.
- *Exclusive* . . . replaceable-on-the-job cylinder liners for easy maintenance.
- Heavy duty, ball-type main bearings which need no adjustment.
- *Exclusive* . . . field-replaceable crosshead guide of special alloy, honed to mirror finish.
- Patented "Dual Cushion" valves for efficient, lasting life and quiet action.
- Full force-feed lubrication to all working parts.
- Rugged construction throughout for long life, low maintenance.
- Single-stage, double-acting . . . vertical design for greater economy of floor space.

Joy WG-9 Heavy Duty Compressors are available in fifteen different capacities and with a wide range of pressures from 30 lbs. up. Write for bulletins on standard, booster or oil-free models, to ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario*

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SPECIALISTS IN THE COMPRESSION AND MOVEMENT OF AIR AND GASES SINCE 1885

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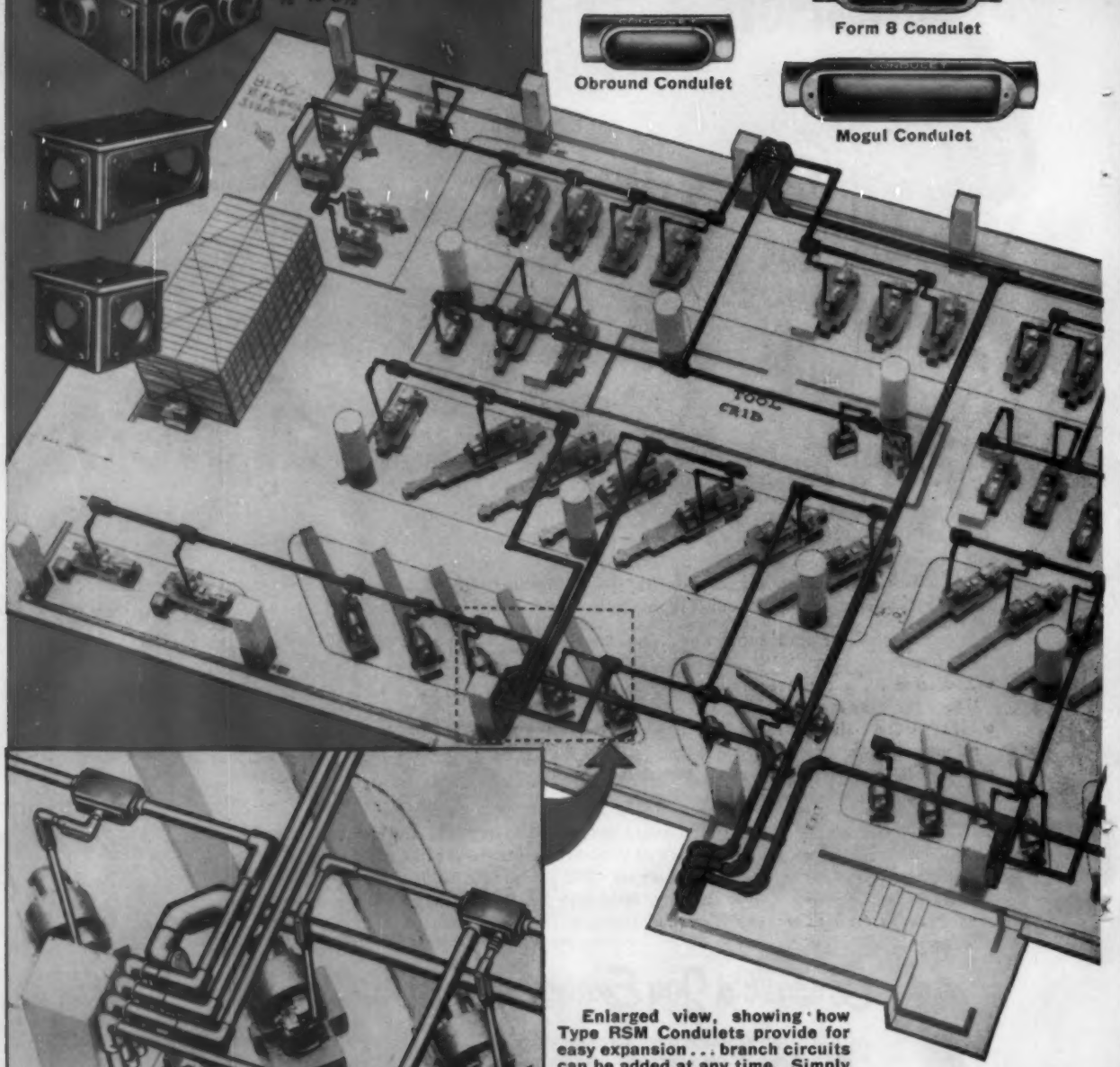
for MODERN WIRING... the CONDULET* and rigid

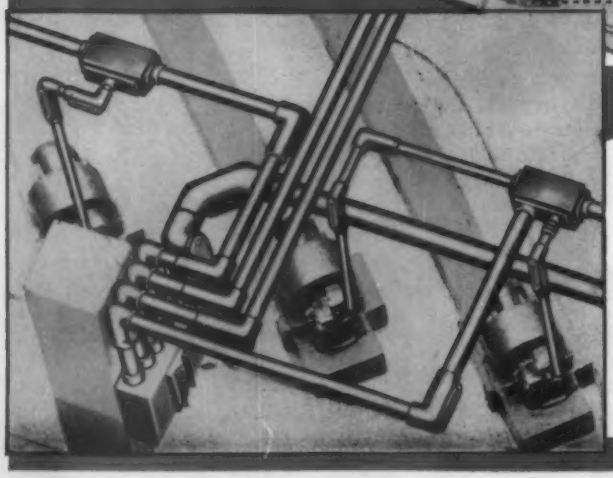
RS Series Junction Condulets take detachable hub plates with 1, 2, or 3 hubs for conduit from ½" to 3½"

Form 8 Condulet

Obround Condulet

Mogul Condulet



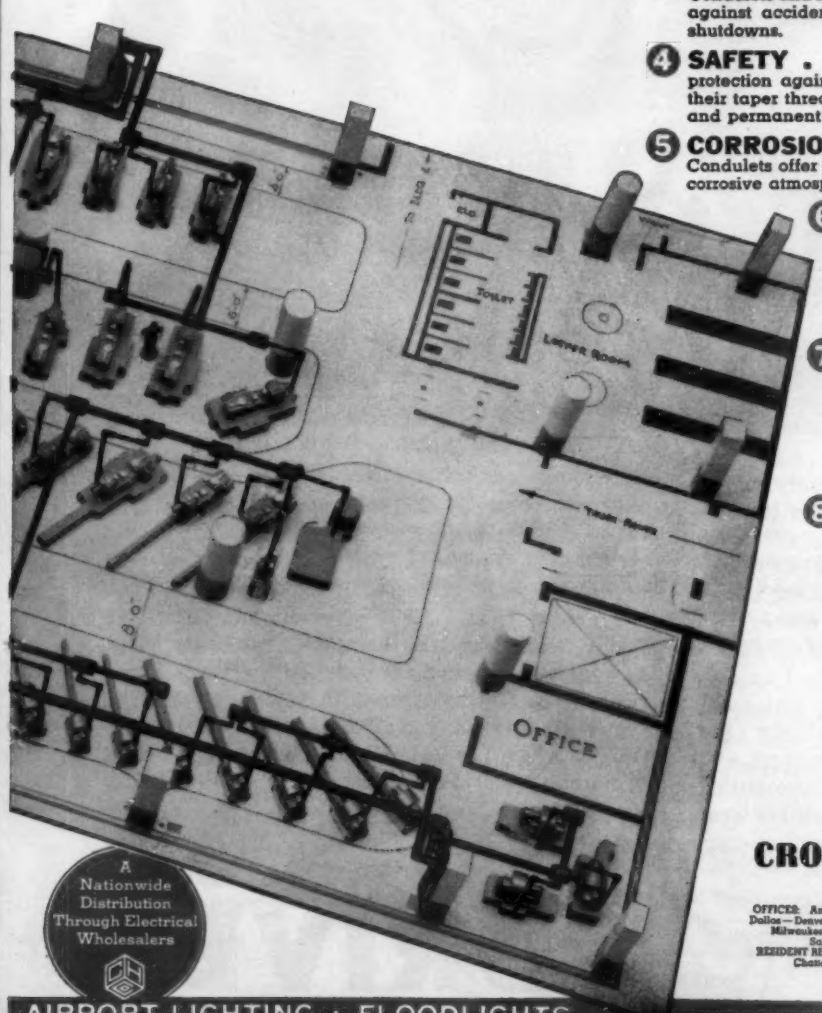


Enlarged view, showing how Type RSM Conduletes provide for easy expansion . . . branch circuits can be added at any time. Simply replace a blank plate with a plate that has the required number and size of hubs.

CONDULETS · TRAFFIC SIGNALS

conduit method gives YOU definite advantages!

The photograph below shows a model of an actual installation in a screw machine department. It is an outstanding example of a layout that meets modern industry's need for flexibility, while retaining the enduring protection and safety that can only be given by cast Condulets and rigid conduit.



1 FLEXIBILITY . . . A modern Condulet installation, like the one illustrated below, provides for the vigorous growth and changing conditions of a modern industry. The RS Series Condulets with their detachable hub plates make it easy to change circuits or add additional circuits at any time.

2 UNIVERSAL APPLICATION . . . Galvanized Condulets and galvanized rigid conduit may be used under all atmospheric conditions and occupancies.

3 MECHANICAL PROTECTION . . . Cast Feraloy Condulets and rigid conduit provide the best possible protection against accidental damage to the wiring — prevents costly shutdowns.

4 SAFETY . . . A Condulet installation gives maximum protection against personal injury and fires. Condulets with their taper threaded hubs and rigid conduit provide a reliable and permanent low resistance path to ground.

5 CORROSION RESISTING . . . Cast Feraloy Condulets offer the best protection wherever moisture, dust or corrosive atmospheres are present.

6 ECONOMY . . . Direct comparison of Condulet and rigid circuit installations with other wiring methods show comparable installed costs. The durability, safety, and low maintenance cost of Condulet installations produces savings which pay dividends over the years.

7 QUALITY . . . All Condulets are built to Crouse-Hinds' high standard of quality with painstaking care by skilled craftsmen. Thousands of Condulet installations that are still in active service after twenty, thirty, forty or more years offer positive proof that the trademark CONDULET stands for reliability and long life.

8 VARIETY . . . Thousands of types and sizes of Condulets, plugs and receptacles, and lighting fixtures are listed in the Condulet Catalog, including a complete explosion-proof and dust-tight line for use in hazardous locations. There is a Condulet for every purpose.

On your next electrical layout, whether modernization or new construction, plan to get all of the benefits of sturdy cast Feraloy Condulets and rigid conduit.

*CONDULET is a coined word registered in the U. S. Patent Office. It designates a product made only by the Crouse-Hinds Company.

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AIRPORT LIGHTING · FLOODLIGHTS

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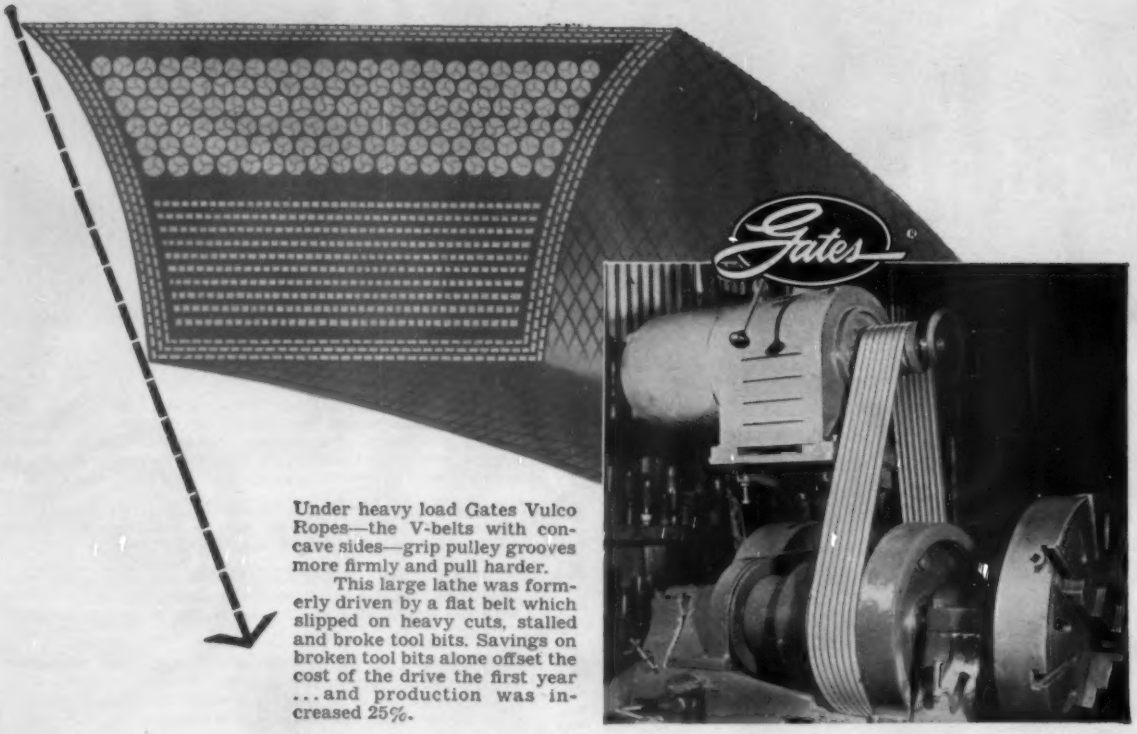

Under heavy load Gates Vulco Ropes—the V-belts with concave sides—grip pulley grooves more firmly and pull harder.

This large lathe was formerly driven by a flat belt which slipped on heavy cuts, stalled and broke tool bits. Savings on broken tool bits alone offset the cost of the drive the first year ...and production was increased 25%.

Concave sides keep belt costs down!

Industry is saving thousands and thousands of dollars every year by specifying Gates Vulco Ropes—the V-Belts with *concave sides* (U.S. Pat. No. 1813698).

Here's the interesting reason *why* Gates belts save money:

On the bend around the sheave the *precisely engineered* concave sides (Fig. 1) of the Gates belt fill out and become straight (Fig. 1-A). Thus the belt makes uniform contact with the sides of the pulley. That means sure pulling power and *even distribution of wear*. Longer wear, fewer replacements cut belt costs...reduce down time...contribute to profits.

Simple test proves value of concave sides

Bend a straight-sided belt (Fig. 2) and feel the sides *bulge out* around the bend. The bulging sides prevent the belt from fitting evenly in the pulley groove (Fig. 2-A). Uneven contact causes uneven wear...shortens belt life...increases costs.

Keep belt costs *down* by specifying Gates Vulco Rope Drives—the V-Belt with *concave sides*. Belts you need are readily available from nearby distributor stocks. The Gates Rubber Company, Denver, Colorado—*World's Largest Maker of V-Belts.*

Gates Engineering Offices and Distributor Stocks are located in all industrial centers of the United States and Canada, and in 70 other countries throughout the world.

VPA 28-A

GATES VULCO ROPE DRIVES

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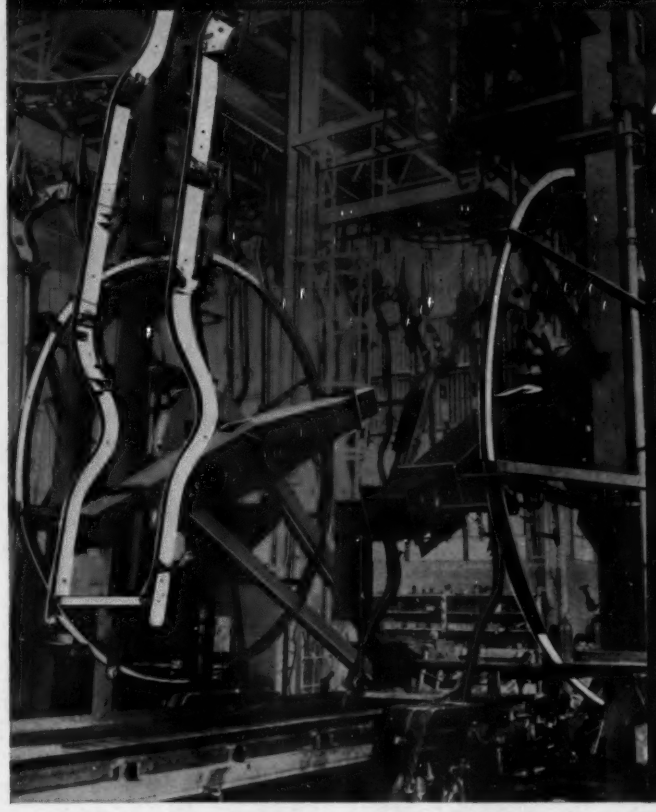
JERVIS B. WEBB

CONVEYOR ENGINEERING, MANUFACTURE, INSTALLATION and AUTOMATION

FROM SLAT TO TROLLEY CONVEYOR *Automatically*



Ferris wheel developed by Webb automatically lifts frames from assembly line and hooks them on overhead trolley conveyor.

. . . Another Example of

WEBB®

Automation

Located in Philadelphia is one of the country's most modern plants for producing passenger car chassis frames. It is equipped with conveyor systems that automatically carry 3,000 of the large frames a day through various assembly operations, painting and shipping.

Slat conveyors are used in assembly and shipping departments while overhead trolley conveyors carry assembled frames through washing, painting and drying.

At the end of the final assembly line, frames are automatically picked off the slat conveyor by a unique two-arm Ferris wheel device (designed by Webb) and hooked on the overhead conveyor for washing and painting. Another automatic device, built by Webb, has three trunnion-mounted arms which pick frames off the overhead conveyor after painting and deposit them on the slat conveyor in shipping room.

For automatic handling of any size or type of material, Webb engineering experience and reputation is your best assurance of receiving the finest in conveyor automation.

Write to us on your company letterhead and we will be happy to place your name on the Webb mailing list to receive factual technical information on conveyor installations, case history reports, and new product literature.

JERVIS B. WEBB CO.

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"THIS LUBRICANT CUT BEARING REPLACEMENTS OVER 40%"

says—HANOVER BUILDING SUPPLY CO. of Hanover, Pa.

"Before using LUBRIPLATE, we replaced the wheel bearings in over 50% of our trucks each year. Since using it, bearing replacements have dropped to less than 10%. We have also been able to increase periods between chassis lubrications from 500 to 2000 miles. We are very happy over our change to LUBRIPLATE, and heartily recommend it to fleet operators interested in saving money."

HANOVER BUILDING SUPPLY CO.
C. O. Albright, Pres.

REGARDLESS OF THE SIZE AND TYPE OF YOUR MACHINERY, LUBRIPLATE GREASE AND FLUID TYPE LUBRICANTS WILL IMPROVE ITS OPERATION AND REDUCE MAINTENANCE COSTS.

LUBRIPLATE is available in grease and fluid densities for every purpose... LUBRIPLATE H.D.S. MOTOR OIL meets today's exacting requirements for gasoline and diesel engines.

For nearest LUBRIPLATE distributor see Classified Telephone Directory. Send for free "LUBRIPLATE DATA BOOK"... a valuable treatise on lubrication. Write LUBRIPLATE DIVISION, Fiske Brothers Refining Co., Newark 5, N. J. or Toledo 5, Ohio.

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BACKTALK about our past issues

Edited by R. L. Marinello

Copies of Construction Series

PLANT ENGINEERING:

"I wish to compliment you on the excellent series of articles which you have published, entitled 'Construction Briefs' by Byron A. Engelbach.

"Although we receive your magazine regularly several of the old issues had been discarded before I had an opportunity to remove these articles.

"I would very much appreciate your sending the entire series of construction articles." *H. J. McKone, Supervising Engineer, United States Rubber Co., Naugatuck, Connecticut.*

▶ Thank you for your nice words about the construction series. In order to make this material available to the many readers who have asked for it, we have had the entire series published in two booklets. Each set contains six articles. These are available at 50 cents each.—*Editors.*

Snow White's Wiping Cloth

PLANT ENGINEERING:

"I was very interested in the July, 1955 issue of PLANT ENGINEERING and the article 'Operation Snow White.' Mention is made in the article of a specially treated wiping cloth which is used at the snow white operation.

"Could you supply me with more information regarding this cloth along with the address of the manufacturer?" *R. Philip Hanes, Jr., Vice President, Hanes Dye & Finishing Co., Box 202, Winston-Salem, North Carolina.*

▶ We have forwarded your request to General Electric's News Bureau in Schenectady, requesting that they contact you about the wiping cloth.—*Editors.*

Comments on Plastics Survey

▶ Readers will find the report on the plastics survey, which PLANT ENGINEERING conducted, in this issue. We received a number of interesting and helpful suggestions from plastics manufacturers who cooperated in preparing the questionnaire. Because of space limitations it is impossible to publish the remarks from all the manufacturers; however, we have taken several pertinent comments from one of the replies.—*Editors.*

"It is impossible for plant engineers to spend the time to do their own investigation of the myriad numbers of new products appearing every day on the market; they are only cursorily interested in the beauty or weight of the new products; as engineers, they want all the technical factual data they can get. It is incumbent upon manufacturers to provide this data.

"Plastics have in their relatively short lifetime proved their versatility and usefulness; if we look only at the reduction of corrosion losses in industry effected by the use of plastics, we have an inspiring indication of plastics' role. The future of plastic applications is limited only by the rapidity with which drawing board and test tube ideas are transformed into products.

"High temperature, high tensile plastics with corrosion resistivity and workable properties are awaited today by industry. The plastics industry has promised these materials, and indications are that they are close to a reality. Elimination of maintenance and the possibility of new industrial processes are two important factors in industrial production; plastics can well be the key to both of these eventualities." *Francis D. Donovan, Division Engineer, H. N. Hartwell & Son, Inc., Boston, Massachusetts.*

Camera Article to be Routed

PLANT ENGINEERING:

"Your presentation of the Ansco paper on 'Camera Short Cuts for Plant Changes' is very good.

"Our company is presently engaged in a standardization program to reduce engineering time requirements. This technique is a good idea and I would appreciate receiving about ten copies of this article for submission to our various plant engineers for consideration as a standard short cut method." *D. R. Keck, Chairman, Standards Programs, Celanese Corporation of America, Charlotte, N. C.*

▶ Because of the many requests for copies of this article, we are able to send you only five copies and trust that they will take care of your needs.—*Editors.*

Oilless Bearings

PLANT ENGINEERING:

"In the July, 1955, issue of PLANT ENGINEERING, an article on 'Oilless Bearings for Industry's Dirty Jobs' describes a type of oilless bearing made of hardwood. The lubrication is impregnated into the wood so that the bearings do not have to be oiled.

"Please send to the writer's attention additional information regarding these

BETZ • *A Great Name In Water Conditioning*

They all work for you!

It takes the combined ability and experience of many people to engineer effective water conditioning.

Few plants, however, can afford to maintain or establish an internal staff capable of supplying the constant flow of engineering knowledge, the diversification of thinking, the thousands of creative and supervisory man-hours that are necessary to the engineering, planning, and control of an effective water conditioning program.

By assigning the responsibility for result-getting water conditioning in your plant to the Betz Organization, you gain immediately the services of field, staff, and consulting engineers, researchers, chemists, and production personnel . . . *plus* the basic objectivity of an "outside" organization providing individual attention to your individual problems.

What's more, the services of these team specialists are available to you *without actually putting them on your payroll!*

Whether your problem requires boiler or cooling water conditioning, Betz completely-integrated service brings into play techniques, methods, and engineering that can make all the difference in *results.*

A Betz District Engineer, one of the many important members of the Betz service "team", will be happy to give you the details of our result-getting service. Why not call him in *today?*

W. H. & L. D. BETZ, Gillingham & Worth Streets, Philadelphia 24, Pa. In Canada: BETZ Laboratories Limited, Montreal 1.

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CONSULTANTS ON INDUSTRIAL WATER PROBLEMS

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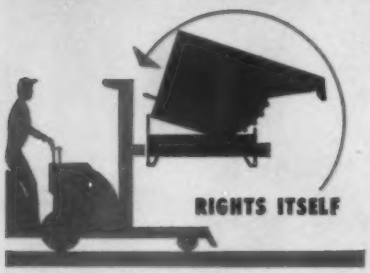

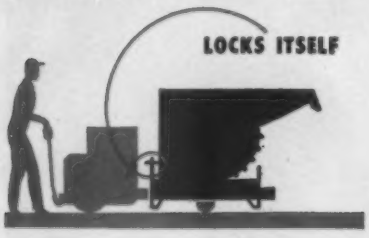

Cuts hand unloading costs 50% or more

Figure it out yourself. Compare the cost of this one-man semi-automatic operation with the time and labor involved in hand-unloading. The answer is obvious. Hundreds of leading industries have proved it . . . and are using thousands of Roura Self-Dumping Hoppers for handling wet or dry, hot or cold bulky materials.

Roura builds 'em rugged. They're made of extra heavy gauge metal with sturdy welded joints to stand up under the terrific knocks and bangs of rough handling. Fit any standard fork or platform lift truck. Also available mounted on live skids—casters with malleable or rubber tired wheels. Sizes from ¾ to 2 cubic yards.

Let Roura help *you* cut costs.

ROURA
Self-Dumping
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ROURA IRON WORKS, INC.
1413 Woodland Ave., Detroit 11, Michigan

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BACKTALK

bearings, such as, size, temperatures at which they can be used, prices, etc.

"In the event this information is not available, please advise the name of the manufacturing company and we will write to them direct." *Earl Lindeman, Buyer, Columbia-Southern Chemical Corp., Subsidiary of Pittsburgh Plate Glass Co., Barberton, Ohio.*

▶ We are requesting the manufacturer, Arguto Oilless Bearing Co., 143 West Berkeley, Philadelphia 44, Pennsylvania, to send you complete information on these bearings.—*Editors.*

Color Code for Piping Systems

PLANT ENGINEERING:

"Recently I have been reviewing current issues of PLANT ENGINEERING magazine in an effort to locate an article pertaining to color coding of industrial piping systems, namely, water, air, gas, etc., in an effort to set up such a code for our organization.

"Unsuccessful in this attempt—can you advise us if such an article on this subject has ever been published and, if so, are reprints available." *N. A. Flemming, Plant Manager, The Polymer Corp., Reading, Pennsylvania.*

▶ We published an article on this subject in August, 1954. The title was "GM's New Piping Color Code." We are happy to send you tear sheets of it with the compliments of the editorial department. You will also note that there is a reference in this article to the ASME Scheme for Identification of Piping Systems which may be purchased from the Society.—*Editors.*

Pallet Manufacturer

PLANT ENGINEERING:

"Will you kindly inform us who manufactures the Flow-Matic boxes, chutes and hoppers mentioned in the article '900 Pallets Are Real Gone, Here,' appearing in the August, 1955, issue." *Isaac D. Blakley, Methods, Bassick-Sack Division, The Bassick Co., Winston Salem, N. C.*

▶ The Flow-Matic boxes, chutes and hoppers are manufactured by the Powell Pressed Steel Co. of Hubbard, Ohio. We are notifying Mr. A. G. Knowles of this company of your interest in getting additional information.—*Editors.*

Liked Dust Collecting Article

PLANT ENGINEERING:

"I would like to thank your organization for the manner in which you handled the publication of the article 'Dust Collecting Job Done in Air-Tight Chamber' in our new asbestos mill in Canada.

"I regularly receive your magazine in my office. When the August issue was received I was pleasantly surprised to see Mr. Jessen's article. I wasn't aware it was being written.

"Mr. Jessen is one of our best engineers and is deserving of the recognition he will receive from a paper published in a magazine such as PLANT ENGINEERING." *K. W. Huffine, Vice President for Production, Johns-Manville Corp., New York, N. Y.*

Pump Inquiry

PLANT ENGINEERING:

"On page 123 of the April, 1955 issue of your magazine, there appears an article 'Pump Tackles Tough Job at I-T-E.'

"We would greatly appreciate it if you can obtain for us the name of the pump and the name of the company who manufactured it." *A. I. Vines, Chief Mechanical Engineer, Arcrods Corp., Sparrows Point, Maryland.*

▶ The name of the pump is Chempump and it is manufactured by the Chempump Corp., 1300 East Mermaid Lane, Philadelphia 18, Penn. We are notifying Mr. William W. Drake of your interest in getting more information about this pump.—*Editors.*

Plan to Use Illustrations In New Edition of Book

PLANT ENGINEERING:

"I should like your permission to use two illustrations which appeared in the July, 1955, issue of PLANT ENGINEERING. These illustrations are Fig. 1, page 102 and Fig. 4, page 104, of the article on automatic controls applied to an aircraft spar and skin milling machine made by Giddings and Lewis Machine Tool Co.

"I should also appreciate your sending me glossy prints of these illustrations. We wish to use them in the third edition of *Industrial Organization and Management*, to be published by the McGraw-Hill Book Co." *Lawrence L. Bethel, President, Fashion Institute of Technology, New York, N. Y.*

▶ We are pleased to know that these illustrations will be used in the new edition of this book and are happy to send them to you.—*Editors.*

Name of Manufacturer

PLANT ENGINEERING:

"In the August, 1955, issue of your publication, a unit designated as the Sky-Worker was illustrated on page 101.

"Please advise us of the name and location of the manufacturer of this unit so that we may contact them for further information." *F. F. Tippett, Purchasing Department, California and Hawaiian Sugar Refining Corp., San Francisco, California.*

▶ The manufacturer is the Maxwell Equipment Co., Ford Street, Milford, Connecticut. Incidentally, we are notifying Mr. John S. McConnell of Maxwell of your interest.—*Editors.*

GENERAL CABLE

THE GREATEST NAME IN ELECTRICAL WIRE AND CABLE

A dramatic new advance in electrical wiring for all applications up to 600 volts and wherever heat, vapors, moisture and aging are problems. Safety m.i. Wiring is ideal for low voltage, lighting, power, control, machine tool and equipment uses.

The mineral insulation of Safety m.i. Wiring is physically stable up to 2800° Centigrade . . . will not burn, deteriorate, support combustion, or convey flame . . . provides extra safety in boiler rooms, around steam pipes, boiler stacks and other "hot spots." Simple fittings seal both ends of wiring runs . . . no possible entrance for moisture.

Underwriters' Approved Safety (Type m.i.) Wiring Systems offers lower installation and maintenance costs. Acts as its own conduit . . . can be installed in one operation with standard switch and junction boxes. Easily shaped on the job, Safety m.i. can be fastened with standard clamps or straps . . . stays put permanently!

Save time and money! Get a neater job! Simplify planning! Ask your General Cable Representative for all the facts about Safety m.i. Wiring Systems. Remember, too, General Cable is the *only* manufacturer who can supply *all* your wire and cable needs!

GENERAL CABLE
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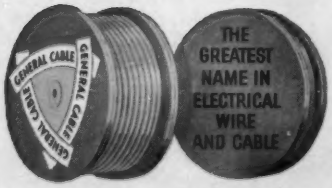

BARE, WEATHERPROOF, INSULATED WIRES and CABLES FOR EVERY ELECTRICAL PURPOSE

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PLANT ENGINEERS' DIGEST so those who rush may read and know what's new

Edited by Marjorie E. Weissman

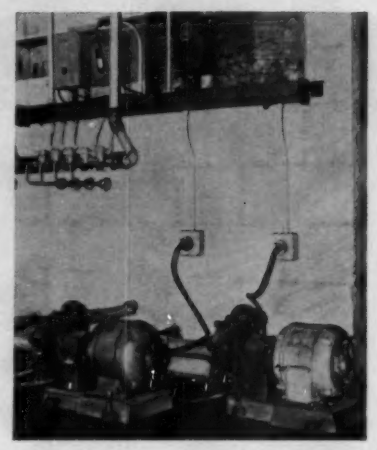
Pumps Thrive on Hydrofluoric Acid

IN THE production of television tubes at the National Video Company, Chicago, Ill., each tube is washed three times in a high-velocity jet of 12 per cent hydrofluoric acid. This acid bath removes oil and other impurities from the inside of the tube prior to applying the screen coating.

To keep up with expanding production, the company, six years ago, designed and placed in service the first of many high-speed, automatic tube washing machines. Tubes are placed on a rotating rack which indexes through several washing and rinsing stations. Water and acid jets are synchronized and automatically timed with the rotation of the table.

The jets of hydrofluoric acid are fed directly from pumps in the base of each washing section. The pumps turn on and off twice every minute. The acid draining from the neck of the tube is collected in a well and recirculated. This adds to the unusually severe service for the pumps, because the acid solution eventually picks up small abrasive particles which circulate through the pump.

The company now uses 26 centrifugal pumps of the involute type. The molded hard rubber casings and impellers in the pumps are highly resistant to strong acids and other chemicals and have high mechanical strength. No metal comes into contact with the acid.



Television tubes are cleaned by hydrofluoric acid jets fed from 26 pumps

In each pump the shaft is rubber covered as an integral unit with the impeller, eliminating vulnerable threaded or keyed assemblies. The seal is of a packingless design, consisting of two carbon seal rings in light-pressure, rotating contact. Low blades molded into the back of the 6-in. diam hard rubber impeller maintain a low fluid pressure at the seal, reducing possibility of leakage, and keeping abrasive particles away from the seal when the pump is operating.

Though many of these pumps have operated every 30 seconds, almost 24 hr a day, six days a week, month after month for several years, the company reports excellent service. There have been no failures of casings, impellers or shafts. Main maintenance expense has been replacement of seals which is nominal. *From a release of American Hard Rubber Co., New York, N. Y.*

Bench Mobility Reduces Rejects in Electrical System Assembly

MOBILE WORK benches equipped with casters and truck locks have practically eliminated manual handling of electrical control systems and components produced at Vickers Electric Div., Vickers, Inc., St. Louis, Mo.

In operation, a mobile bench is lined up at each end of a stationary supply table, and locked into position. Assembly work on small electrical equipment is performed, then, when the units are completed, the truck locks are released and the benches are moved to the inspection department. Here, they are positioned alongside testing boards, the truck locks engaged and the inspection carried out. With completion of the final inspection, assembled units are moved by hand for a short distance to the packing area, while the empty benches are rolled to the assembly area to begin another round of serving as combined work benches and floor trucks.

Benches are made entirely of wood and stand 32 in. high. Working areas are 2 ft 6 in. by 3 ft. Rubber wheels allow the benches to roll smoothly over minor floor obstructions and, at the same time, provide floor protection and quiet truck movement. Benches can be used on an inclined or uneven floor.

Since the introduction of the mobile benches production rate has risen, while reject rate has fallen because less damage occurs due to handling. *From Faultless Facts, published by Faultless Caster Corp., Evansville, Ind.*

Electrical control systems are assembled on mobile work bench at each end of stationary table. Complete assemblies are then rolled on bench to inspection

Double Duty Conveyor

THE HANDLING of a large volume of shoes at the plant of the Shoe Corporation of America, Columbus, Ohio, presented a problem of moving empty shipping cartons from the bin area where they are unpacked, to the packing area where the cartons are reused for outgoing shipments. This operation must be done continuously, with minimum handling and without clutter in aisles and passageways.

To transport incoming cartons of

DeLuxe built-in FEATURES CUT INSTALLATION EXPENSE by 50%

By built-in features we mean the components of DeLuxe steel shelving are made *at our factory*. This permits easy assembly *without* the tedious, time-consuming jobs found necessary in assembling ordinary shelving.

Your DeLuxe dealer and our design engineering and estimating department, without obligation, will be pleased to work up an installation to fit your requirement—and show you how you can save 50% of installation expense.

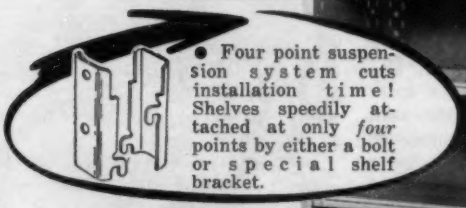
FREE

48 PAGE CATALOG

Here is the DeLuxe craftsmanship story . . . told in this 48-page fully illustrated catalog. Request your free copy.

● Sets up quickly . . . utilizing sturdy one-piece I-Beam uprights.

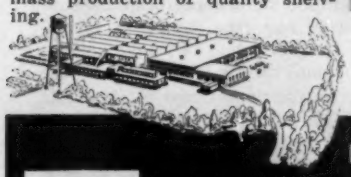
● Combination floor angle and shelf support provides flanged bearing surface to distribute load equally over large floor area.



● Four point suspension system cuts installation time! Shelves speedily attached at only *four* points by either a bolt or special shelf bracket.

● Shelves have reinforcing bar imbedded into front and rear flanges and returned into the end flanges where they engage the uprights.

For over 25 years our plant has been particularly devoted to the mass production of quality shelving.



A division of Royal Metal Manufacturing Company

DELUXE METAL FURNITURE CO.

396 STRUTHERS STREET, WARREN, PENNSYLVANIA

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PLANT ENGINEERS' DIGEST

(Digest begins on page 34)

shoes to storage areas in the warehouse, and to transport merchandise from storage to packing areas, a tow conveyor had been installed. To handle the empty cartons, a series of counterweighted, horizontal steel rods was

Empty cartons on hanger rods travel away from stock area. Carton in the background is on short roller conveyor, will slide down gravity chute to left

mounted, at regular intervals, along the tow conveyor chain. These rods are used as hangers on which the empty cartons are hung as the line passes through the stock area.

The cartons remain on the rods until they reach a short length of roller conveyor placed in the line with their travel. The cartons roll along the conveyor for a short distance and are deflected down a gravity chute installed at a right angle to the roller conveyor. As the cartons drop into the chute, they automatically slip off the hanger rods.

At the end of the chute the cartons are picked up by an inclined belt conveyor which brings them to the packing area. Here, they are used to pack outgoing orders which are received on carts as the tow line completes the circuit from the storage area to the packing aid shipping points. *From a release for Lamson Corp., Syracuse, N.Y.*

Card File for Pumps

RECORDS on all pumps, with complete information, and filed in an accessible location, can be invaluable in ordering repair parts, establishing lubrication and maintenance schedules and in diagnosis of pump failures.

Pump cards should contain complete information including manufacturer's name, figure number, size, serial number, construction, materials, rated capacity and head, driver horsepower, RPM, and lubrication requirements. Sufficient space should also be left so that a brief notation could be made of every failure or malfunction, the date and time it occurred, and the repairs and parts required to return it to service. With this information on a small card filed in an accessible location, a number of special trips to each pump to examine the nameplate would be unnecessary. Repair parts orders could be entered with complete information, and costly delays could be avoided. Pump suitability for new requirements due to process changes could also be determined.

Pumps should be identified according to their importance to production. Colored tabs should be used to identify primary pumps which would stop production if they were to fail. Maintenance schedules on primary pumps should be established to prevent repairs or shutdowns while the plant is operating.

Notations of pump failures and the repairs required can be used to define the optimum period of any given pump before complete inspection and overhaul is required.

On other pumps, the record may indicate frequent failures. This may suggest that semi-annual inspection and repair are required. The chronological listing of failures will be invaluable in diagnosing the problem and effecting its cure.

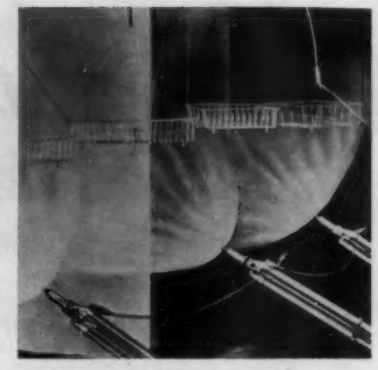
Notations of pump repairs can also be used to develop the proper spare parts inventory. Frequent replacement of parts subject to wear may indicate a different material would be more economical. This can be determined accurately only when an accurate history of parts life is available. *From Goulds News, published by Goulds Pumps, Inc., Seneca Falls, N. Y.*

Vinyl Sprayed Electrostatically

FABRICATED wire baskets and other wire goods are electrostatically spray-coated with vinyl plastisols on a production line basis instead of dip-coated as previously.

The process, which employs "Ionic Guns," sprays an ionized mist of specially formulated plastisol around the object to be coated. The equipment is an adaptation of Scientific Electric standard high potential spraying equipment.

The electrostatic method is twice as fast as dip-coating, eliminates plastisol wastage due to "running" and reduces



Fabricated wire baskets are electrostatically sprayed with vinyl plastic

the intermittent handling ordinarily required in dip-coating. *From a release of United Chromium Division of Metal & Thermit Corporation, New York, New York.*

Firing a Cold Boiler

IF A BOILER has been out of use for sufficient time to permit all parts of the setting to become cold, or if a new boiler is being put into service (in either case the boiler being one of a battery, a part of which is in service), the following method for firing is suggested.

Be sure that all workmen are out of the boiler and setting, and that all manhole covers or other parts are properly in place.

See that the stop valve between the "gooseneck" and header is tight, and that the drain pipes in the gooseneck are open; also that the drain valve under the non-return valve (if such is in use) is open, and that the connection to the steam gage is open and in good condition.

Open the feed valve and fill the boiler gradually, until the water level stands between the first and second gages of the water column.

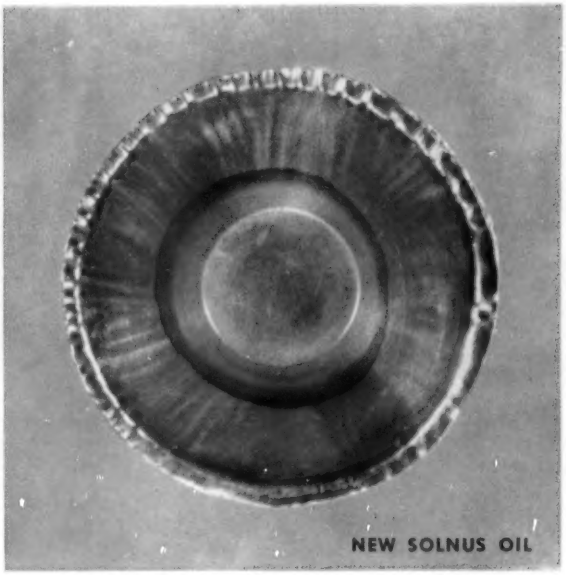
Start a light wood fire (oil as well as coal-fired boilers) in the furnace and have the stack damper practically closed. The escape of smoke under such conditions, from the setting, will indicate any air leaks, unclosed doors, or other defects. If such leaks are observed they must be corrected before proceeding with firing.

Continue the firing with gradual increase of fuel (the damper being adjusted to the extent of smoke generation), until all air is driven from the boiler interior and steam escapes from the drain pipe of the water column, or from any other pipe connections in the boiler which were deliberately left open for the "firing up" test.

Steam pressure in the boiler should be brought up to practically that of

For more facts circle 525 on Reply Card ⟶

To demonstrate the comparative deposit-forming tendencies of compressor oils, two drops of a typical compressor oil were heated until evaporated. Notice the large deposit, *most of which is carbon*, left by the typical compressor oil. A new Solnus oil, after the same evaporation test, leaves a much smaller deposit.



NEW SOLNUS OILS HELP KEEP COMPRESSORS CARBON-FREE

THREE MINUTE TEST right at your desk shows why Solnus oils are the best for your compressors.

The chief enemy of air compressors is carbon build-up. The best way to avoid this hazard is to use the compressor oil that has the lowest carbon-forming tendency.

Sun's new Solnus oils have been proved to be ideal compressor lubricants. The minute amounts of carbon that form are fluffy and blow away easily . . . assurance against dangerous build-up of carbon on valves and exhaust ports. Tear-downs for cleaning are kept to a minimum.

We'd like to show you, right on your desk top, the dramatic test pictured above. Ask your Sun representative about it the next time he calls or write SUN OIL COMPANY, Philadelphia 3, Pa., Dept. SI.

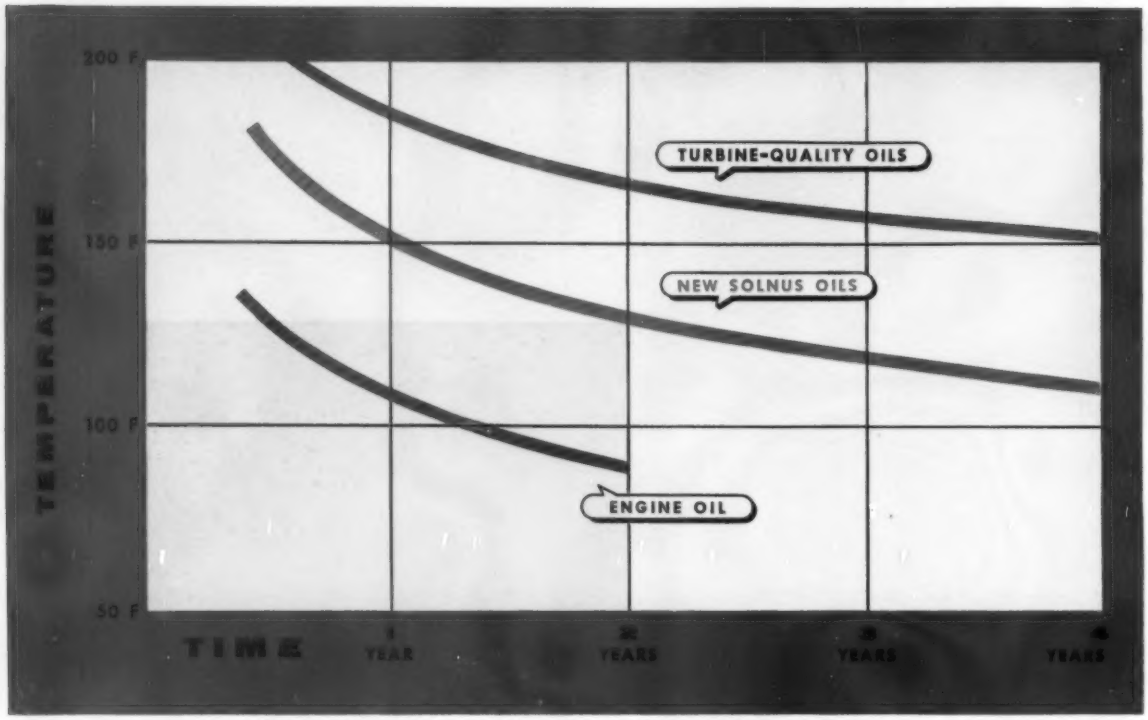
Please turn to the next page

SUNOCO

INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY PHILADELPHIA 3, PA.

IN CANADA: SUN OIL COMPANY, LTD., TORONTO AND MONTREAL



This graph is based on 10% make-up per year and a 40-hour week.
The yellow area represents approximately 80% of all applications.

NEW SOLNUS OILS IDEAL LUBRICANTS FOR 80% OF ALL APPLICATIONS

High grade lubricants for squirt-can prices . . . New Solnus oils give more lubrication per dollar

The lubricated parts of most machines—our estimate is 80%—operate at temperatures below 130 F and the time between oil changes is less than 2 years. New Solnus oils were specifically developed to meet these operating conditions at the lowest possible cost.

The above graph compares the service life of new Solnus oils with that of an expensive, turbine-quality oil, and an oil of the type old-timers call "engine oil". The service life of the turbine-quality oil is excellent and probably covers 99% of all applications . . . but for a premium price! The engine oil has a very limited life. It cannot be used safely, except for a very short time, at even moderately high operating temperatures, and it gives very little protection against rust and corrosion.

Now look at the service life of new Solnus oils. They easily meet the service requirements of at least 80% of all oil lubrication jobs and they sell for a squirt-can price! In addition, new Solnus oils are fortified to prevent both rust and oxidation . . . a feature usually found only in more expensive oils.

For the full story on new Solnus oils, see your Sun representative or write Sun Oil Company, Philadelphia 3, Pa., Dept. SI.

SUNOCO

INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY

PHILADELPHIA 3, PA.

In Canada: Sun Oil Company, Ltd., Toronto and Montreal

PLANT ENGINEERS' DIGEST

(Digest begins on page 34)

the pressure in the header in a minimum period of two hours. If the boilers are new, a much longer time must be taken.

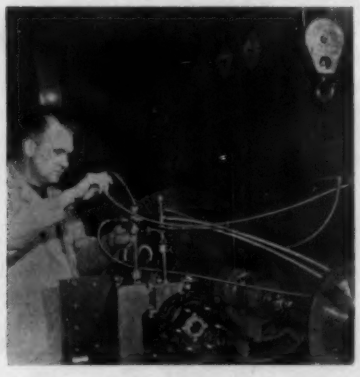
Before firing the boiler to take its share of the load, lift the lever on the safety valve to see that it is free to operate. Note as early as possible whether this valve lifts at the allowed pressure of the boiler, or under that pressure.

The stop valve in the feedwater pipe near the feed main of the boiler house should now be wide open, also the stop valve between the check valve and the boiler. The feed-controlling valve should be adjusted by the water tender to an opening that will provide the required water delivery, and the automatic level-regulating system placed in operation. *From an article by R. R. Taggs, E.E., Jackson, Michigan.*

Hose Handles Synthetic Hydraulic Fluid

USE OF A specially designed hydraulic hose made of a fluorocarbon type resin instead of conventional rubber materials, solved a production testing problem for Sundstrand Machine Tool Company's Aviation Division, Rockford, Ill.

Hydraulic constant speed drives, which are applied to the latest jet engines for driving constant frequency alternators, must be tested prior to shipment and also upon overhaul. For this purpose, the company has developed special test stands. During tests, synthetic hydraulic fluid is circulated at temperatures up to 250 F for production tests and up to 350 F for experimental testing. It is of prime



Operator attaches hose assemblies to drive mounted on a 200 hp dynamometer

Anchor Heavy Machinery firmly with...

UNISORB®

MOUNTING PADS

No bolts, no lag screws, no holes to drill, no floor damage, eliminate up to 85% of transmitted vibration and noise.

Northern Metal Products Company says: "In September 1951, we came to the conclusion that there must be a better way to anchor our machinery to the floor, rather than using bolts. We decided to try Unisorb Mounting Pads, but to tell you frankly, we did not think they would do the job.

"In the course of 3 years' time we thought only of Unisorb when it became necessary to move machinery. In 1954 we moved to our new plant and went to Unisorb Mounting Pads 100% because in the past they had done such a wonderful job."

For complete information about this simplified machine installation method, return the coupon and ask for a copy of "Why It Pays to Anchor Machines with Unisorb".

Please send my free copy of the booklet containing the complete story of UNISORB Mounting.

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STREET.....

CITY..... ZONE.... STATE.....

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For more facts circle 526 on Reply Card

Specify NEW Tannate® heat-resistant packings*

Rhoads has recently developed a new heat-resistant leather for hydraulic and pneumatic applications.

During the last several months, these packings have been tested in the field under a variety of difficult operating conditions.

This new Tannate leather has consistently outperformed the best of the previous leathers under higher temperatures and we are now proud to include it in our line. When specified, they will be supplied at no extra cost.

Tannate heat-resistant packings are recommended for temperatures up to 190° F. continual use or for intermittent use up to 210° F.

Tannate packings will not readily cold flow or score the most highly finished surface. They provide an effective seal against hydraulic oils and many other gases and liquids.

Tannate has a low coefficient of friction . . . is custom impregnated for high or low pressure operation —precision molded and accurately finished to fit snugly against shafts and cylinder walls.

For further details write J. E. Rhoads & Sons, 2100 W. Eleventh St., Wilmington 99, Del.

*Available in U, Vee, Cup, Flange and disc for hydraulic and pneumatic equipment. When ordering please specify Tannate Heat-Resistant packings.

RHOADS
INDUSTRIAL LEATHERS

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For more facts circle 527 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 34)

importance that the fluid be kept clean to avoid contamination of units under test.

A variety of hose materials were investigated and tested for this application, but none proved adequate. Within a short period of time, the hose started to erode and replacement costs were excessive.

The solution proved to be a hose made of fluorocarbon resin with high corrosion resistance. It can withstand temperatures up to 450 F and is unaffected by all oils and fuels. The hose retains its flexibility after contact with fluids at 450 F, and at temperatures of minus 100 F. The hose is supplied with a jacket of stainless steel armor braid.

Together with special stainless steel fittings that can be swaged right over the hose armor, the hose assembly is rated at 1000 psi working pressure.

The hose has been used for 400 hours of testing without showing any signs of wear or erosion. *From a release for Risistoflex Corp., Belleville, N. J.*

Rules for Plant Truck Drivers

THE HUMAN element affects truck operation so closely, that proper selection and efficient training of truck operators are the keys to obtaining maximum truck potential. The following points should be helpful in the maintenance of an effective driver safety program.

Drivers must stop within eight feet in open aisles or roadways; within three feet in narrow aisles, near machinery and in congested areas. A distance of at least 10 feet must be maintained between moving vehicles. Extreme care must be exercised where floors are wet or greasy.

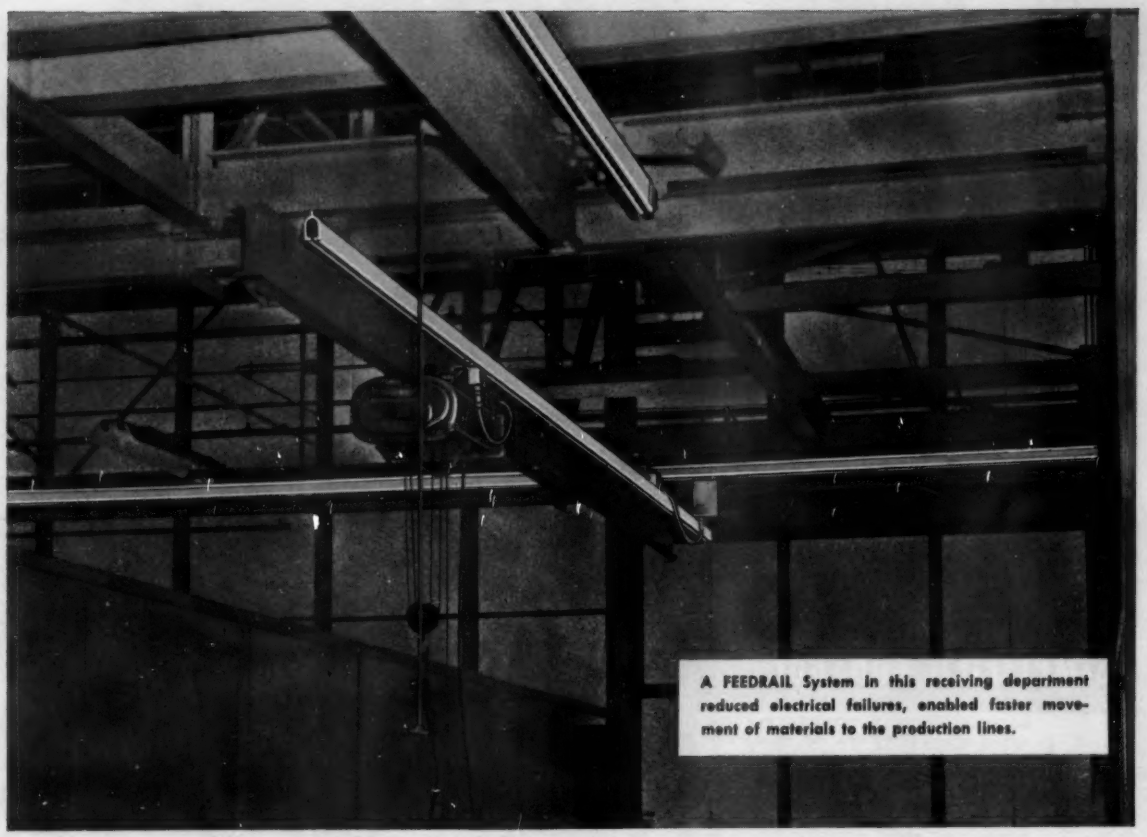
Trucks must be completely stopped and the horn sounded before entering doors of all buildings, approaching blind corners, turning into or crossing main aisles and entering ramps.

Vehicles must be started and stopped without skidding the wheels.

Drivers must learn the capacity of their vehicles and lift no loads above that capacity.

Loads must not obstruct the operator's view. If such size loads are unavoidable, the truck should be moved backwards.

Loads should never be picked up with forks off center. A probable result: spilled loads, damage to truck



A FEEDRAIL System in this receiving department reduced electrical failures, enabled faster movement of materials to the production lines.

Don't be hamstrung by inefficient electrical distribution

START NOW TO PROFIT FROM FEEDRAIL'S MANY ADVANTAGES

Take a good look at your electrical distribution system if you want to put your plant operations on a more efficient, more profitable basis. If your present system doesn't provide *mobile* power . . . modernize it . . . follow the trend to FEEDRAIL.

FEEDRAIL is the safe, modern system which solves your electrical outlet problems. Its movable trolley outlets bring power to the point it's needed — *when it's wanted!* It provides a completely reliable means of electrifying moving "loads" — gives greater safety to cranes and hoists — speeds assembly and production operations by enlarging the service area of portable tools — eliminates troublesome and costly rewiring delays when electrical machines are relocated.

Best of all, its prefabricated unit construction makes installation so simple that you can electrify your entire plant — or a production area at a time — with little or no disruption.

Other advantages: utilizes otherwise wasted headroom; enclosed construction that reduces electrical hazards; clean, modern lines that blend with plant interiors; adaptability that permits it to be easily moved, modified or extended.

Never Becomes Obsolete

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TROLLEY BUSWAYS

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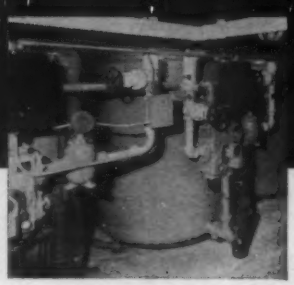

COCHRANE ZEOLITE SOFTENER DELIVERS WATER of zero hardness by the soap test. All commonly known zeolites—greensand, synthetic gel, sulfonated coal and the various styrene medium capacity resins are available for most practical individual application. Units can be adapted for automatic operation. Three 6' x 6' fully automatic Cochrane Zeolite Softeners above provide a capacity of 288,000 lbs. per hr.

Cochrane Hydromatic Valve
***assures* easy, accurate control of ion exchange equipment**

Here is a valve so simple to operate that no knowledge of softening equipment or of the ion-exchange process is required!

The Cochrane Hydromatic Valve consists of an integrated nest of hydraulically-actuated diaphragm valves. Valves are so constructed that it is impossible for any of them to be out of position during operation. Compass point positions for four operating stations on the pilot reduce operating error—assure maximum delivery of high quality effluent without danger of contamination. "Drop tight" construction eliminates the possibility of scoring. Compact, easy to operate Hydromatic Valve is designed for years of dependable operation. Write for Bulletin 4520-B.

The Cochrane Corporation designs and manufactures complete lines of deaeration, precipitation, ion exchange, and water conditioning equipment . . . Consult Cochrane First!

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For more facts circle 529 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 34)

or surrounding areas, injury to operators or other workers. Loads should be prepared so that the weight of a load unit itself is not appreciably off center. Loose loads should be carried in proper containers.

Personnel other than the driver himself should never operate or ride on an industrial truck. Except in extreme cases or when closely supervised, a fork or platform truck should never be used to hoist personnel to reach otherwise inaccessible areas.

Operators should slow down before opening doors by remote control. They should be prepared to stop safely if it is found that the automatic mechanism is out of order or if the way is not clear beyond the door.

Swinging doors should be approached squarely and in the center to avoid breaking hinges.

If the truck has a tilting device it should be used. By tilting the uprights toward the operator the weight of the load is brought back slightly and balance is improved. This slight tilt of eight to 10 degrees helps avoid spilling the load when rounding corners and making quick stops.

Railroad trucks should always be crossed diagonally instead of at right angles.

Every collision should be reported to authorized personnel. Even if no damage is done, the causes of all collisions should be determined and corrected.

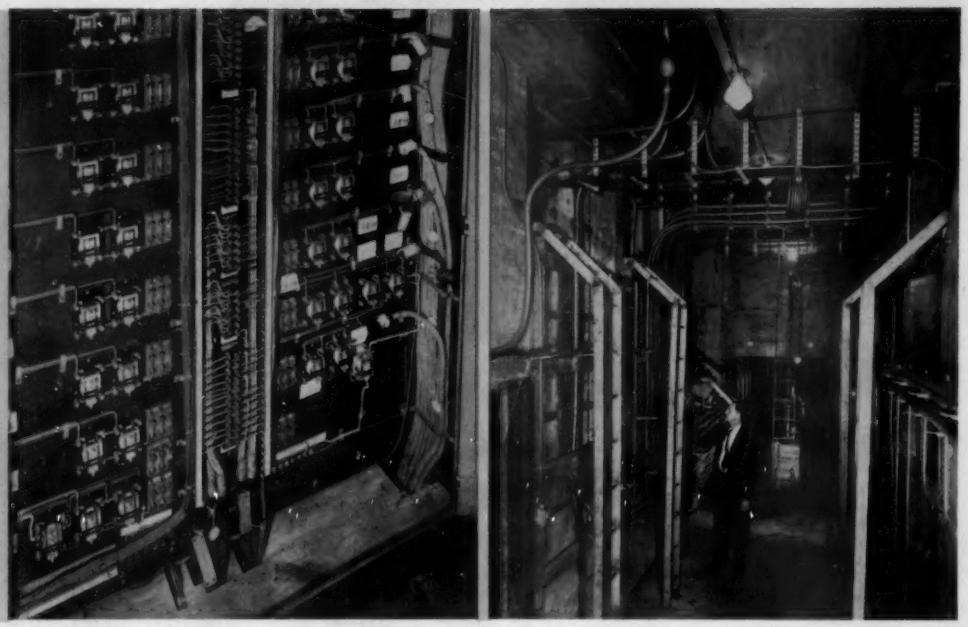
Travel areas for industrial trucks should be kept free of ruts, obstacles, grease, oil, pits, etc. Failure to do so increases accidents. Truck operators should look out for such unsafe operating conditions and report them.

Doorways, corners and other travelways should be outlined with bright colors or hash marks. Pipes, machinery and other obstructions should be outlined in contrasting colors so that drivers can spot them immediately. Also, trucks should be painted in bright colors so they may be seen by other personnel. *From a release for The Elwell-Parker Electric Company, Cleveland, Ohio.*

Heat Oil for Better Production

OIL OUTPUT has been boosted up to 900 per cent in low-producing wells by use of 18-ft long heaters. By heating the oil, and thus lowering its viscosity, a faster rate of flow is possible.

Constructed from six 80-in. Calrod heater units connected in pairs, the



LEFT:
A substantial quantity of Rome Synthinol 901 was used at the General Petroleum plant, to connect plant areas with 16 motor control switch houses. The 900-acre plant produces a full range of petroleum products and many by-products.

RIGHT:
One of the underground distribution vaults at the General Petroleum Corporation refinery, Torrance, Calif. Cable tunnels go off to left and right. Control circuits are wired with Rome Synthinol 901.

To get the best in INDUSTRIAL WIRING

look for acceptance by critical users

Compared to the cost of shutdowns, the *best* equipment and materials cost little whether in refineries, steel mills or most any manufacturing operation. That applies particularly to remote control circuits.

General Petroleum Corporation, Torrance, California, has specified Rome Synthinol® Control Cables. The tough Rome Synthinol 901 (polyvinyl chloride) insulation resists high temperatures, moisture, oils, corrosive chemicals or fumes. The protective Rome Synthinol sheath permits installation in conduit or ducts, directly in earth or aerially.

Consisting of as many as 25 individual conductors of 16 AWG, assembled with a 12 AWG common return, these cables assure the customer of trouble-free operation. Because of its high resistance to environmental hazards Rome Synthinol 901 insulation provides long-time protection for individual conductors when fanned out for terminations. Clear and permanent color coding assures proper circuit identification.

Rome Synthinol 901 insulation provides that extra margin of safety which costs so little in the long run. Its long-time dependability has made it the preference of such critical users as refineries, chemical processors, paper and steel mills.

If you have a control circuit problem, it will pay you to check on the economy and dependability of Rome Synthinol Control Cables. Rome engineers will gladly study your requirements. Write or phone your nearest Rome Cable office.

Installed in the terminal box for this 200 hp water pump, Rome Synthinol 901 gives extra protection to start and stop push-button, high-pressure, alarm, high-level alarm and low-level alarm circuits.

It Costs Less to Buy the Best

ROME CABLE Corporation
ROME · NEW YORK
and
TORRANCE · CALIFORNIA

For more facts circle 530 on Reply Card

The new Schick plant at Lancaster, Pa., designed and built by The Austin Company, uses Sly Dust Filter to maintain a clean plant.

SLY DUST FILTER

KEEPS SCHICK PLANT DUST-FREE

When The Austin Company designed the ultra-modern Schick, Inc., plant at Lancaster, Pa., it kept worker comfort in mind — realizing that efficiency is directly tied in with pleasant working conditions. That's why a Sly Dust Filter was included as an integral part of the design.

For just as the Schick Electric Shaver gives pleasant shaves, the Sly Dust Filter provides for pleasant working conditions. This powerful unit whisks dust away from seven different points in buffing operations—claims dust *at its source* to keep plant atmosphere fresh and clean. Only clean air is emitted to the outside — an extra dividend in community good will.

The Schick plant and Schick products are expertly designed and constructed. So, too, are Sly Dust Filters; they offer important advantages in greater filtering capacity, easier bag replacement, automatic control and other features which spell low-cost operation.

The new Schick plant is another graphic example of how alert planners make use of Sly Dust Filters to improve conditions, increase efficiency. If you have a dust control problem, look to Sly — since 1874 designer, fabricator and erector of the world's finest dust control systems. Write today for Booklet No. 98, "Dust Control by Sly."

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PLANT ENGINEERS' DIGEST

(Digest begins on page 34)

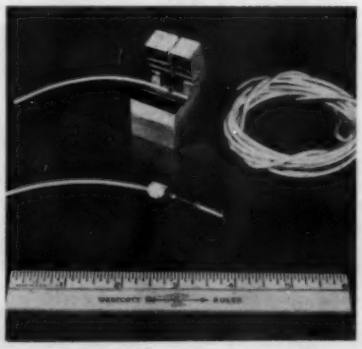
Eighteen-foot heater in oil well lowers oil viscosity and raises production

total rating of each heater is 460 v, 15 kw. The heaters are sealed in oil-tight pipes, and the connections are brought up through a rigid conduit. *From a release for General Electric Company, Schenectady, New York.*

Stripper

SPECIAL Teflon-insulated wire composed of strands too fine to be stripped in a commercial wire stripper, is stripped without nicking or damage in a shop-made tool.

The tool contains a recess into which the wire is placed, and the stripping blade is set to cut the insulation close to the wire. When the tool



Tiny shop-made tool strips insulation from wire without damage or nicking

is closed, the wire rotated and pulled through, the end of the wire is stripped and the fine strands left intact and ready for use. *From a release of Glenn L. Martin Company, Baltimore, Md.*

For more facts circle 532 on Reply Card →

ACCO products

The WRIGHT Hoist for the Job... Helps Build Production Profits

PURCHASE of WRIGHT Speedway Hoists means more than the cost **PRICE**. It means that you have the very best in plant lift equipment **PLUS** the longest-lived, hardest working hoists with a minimum of **MAINTENANCE** requirements. Production men find them more than the **EQUALS** of any hoists with their easy, smooth-running performance. Their **TOTAL** maintenance is so small and service so easy that "down time" **COST** is hardly considered in plants equipped with WRIGHT Speedway Hoists.

Write our York, Pa. office for any or all of these fully informative bulletins—
Bulletin DH-133B on Frame 1 and 1½ WRIGHT Speedways
Catalog E-54A on Frame 2 and 3 WRIGHT Speedways
Bulletin DH-504 on WRIGHT Electric Roller Chain Hoist

ACCO

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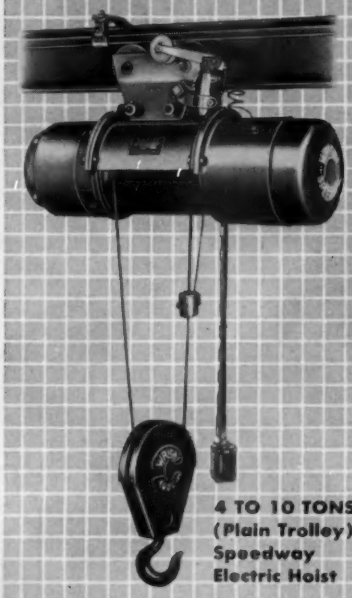
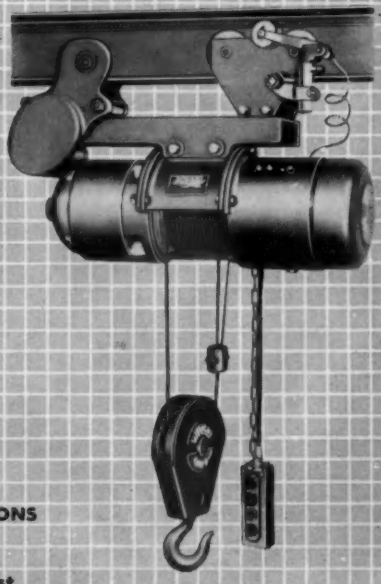
Trolleys
Cranes

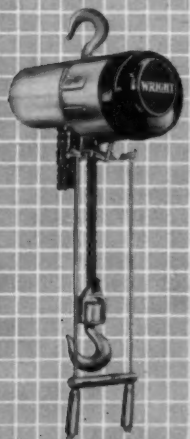
THE HOIST FOR THE JOB
(Frame 2 and 3)



4 TO 10 TONS—
(Plain Trolley)
Speedway
Electric Hoist

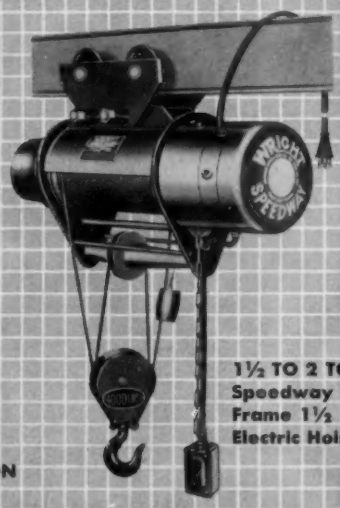


½ TO 6 TONS
(Motor Driven Trolley)
Speedway
Electric Hoist

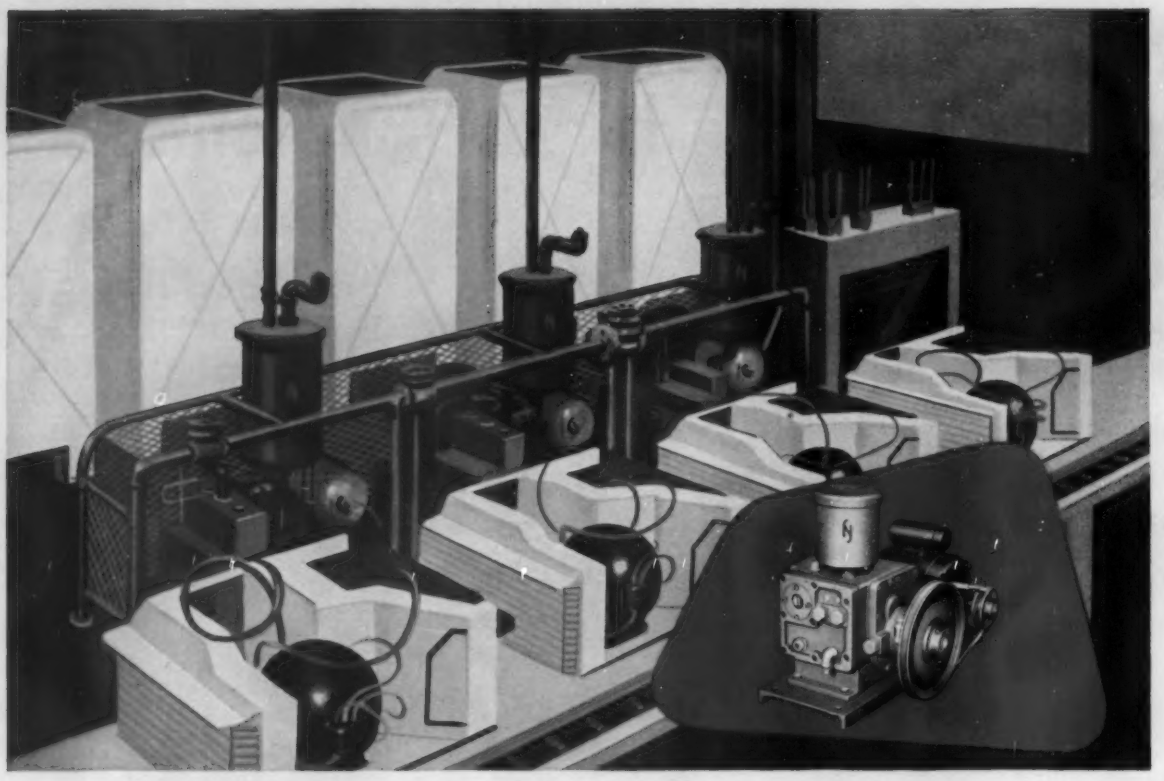


¼ TO 2 TONS
WRIGHT Electric
Roller Chain Hoist

¼ TO 1 TON
Speedway
Frame 1
Electric Hoist



1½ TO 2 TONS
Speedway
Frame 1½
Electric Hoist



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HIGH VACUUM PROCESSING

The cool comfort of modern air conditioning, the sub-zero cold of deep-freeze equipment, the sub-sub-zero of the research laboratory all have one thing in common . . . KINNEY Vacuum Pumps. More and more industries look to High Vacuum Processing as the medium for developing new products . . . for preserving, improving or speeding production of existing products.

Vacuum Processing has opened the doors to many modern miracles . . . Air Conditioning and Refrigeration . . . improved TV and Audion Tubes, Fluorescent and Incandescent Lights . . . Distillation of Penicillin and other "wonder" drugs . . . Vacuum Refining of Metals . . . dehydration of Foods and, of course, Blood Plasma. KINNEY Vacuum Pumps have been prominently associated with all of these developments from "hopeful project to standard production".

New York Air Brake engineering research and development are "doing things!" Three Divisions of the Company concentrate their facilities on advanced design Industrial and Aircraft Hydraulic Equipment with Gear, Dual-Vane and Piston Pumps . . . Gear and Dual-Vane Motors . . . Single, Double-Acting and Telescopic Cylinders . . . Control and Auxiliary Valves.

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Dual-Vane Hydraulic Pumps, 3 to 120 gpm; Fluid Motors, 7 to 140 hp; 2000 psi operation. Piston-Type Pumps for 5000 psi.

HYDRECO DIVISION
Cleveland, Ohio
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WATERTOWN DIVISION
Watertown, N. Y.
Railroad air brake valves for freight and passenger equipment, STRATOPOWER Hydraulic Pumps for Aircraft, to 3000 psi.

KINNEY MANUFACTURING DIVISION
Boston, Mass.
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AURORA PUMP DIVISION
Aurora, Ill.
Liquid Handling Pumps, Centrifugals and deep well Turbines, 7000 gpm, 500 ft. heads. Turbine-type, 150 gpm, 600 ft. heads. Condensate Return Units.

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INTERNATIONAL SALES OFFICE, 90 WEST ST., NEW YORK 6, N. Y.

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Exactly the Power Panelboard you want—when you want it. Your Square D Distributor stocks boxes, interiors and plug-in units which can be quickly assembled to meet virtually any specifications. Above, interior ready for easy mounting in box.

Plug-in Units are installed easily on tubular bus bars. The solid neutral can be changed in minutes. Here is flexibility that reduces "down time" and saves money.

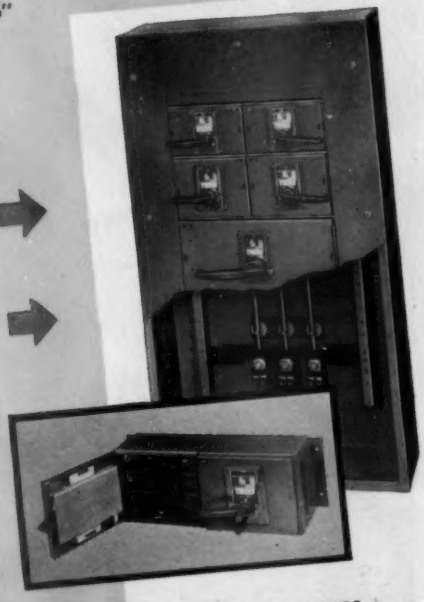
Three Simple Assembly Steps Fronts, with adjustable trim clamps, are available with or without doors.

With ALL these Quality Features

INTERIORS are flexible and adaptable to almost any service and voltage. Plug-in units and solid neutral can be changed simply and quickly.

BOXES provide generous wiring space.
FRONTS furnished with or without doors have adjustable trim clamps.

UNITS have quick-make, quick-break switch mechanism, visible blades and are horsepower rated. 30, 60, 100 and 200 ampere units are plug-in, while 400 and 600 ampere units are bolted to the bus.



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ASK YOUR ELECTRICAL DISTRIBUTOR FOR SQUARE D PRODUCTS

SQUARE D COMPANY

Don't let "Jungle Jangle" sap

your employees' efficiency!

Tests show work output rises as much as 30% with installation of VMP MOBILWALLS

Don't let noise, confusion, and unchanneled traffic take their toll in the productivity of your plant or office. Don't let "Jungle Gym" distractions cause repeated errors, delays, lost motion—low work output.

Smartly styled, easily installed VMP MOBILWALLS are the logical solution. They partition your plant or office into livable working areas, give your employees productive privacy. They can increase work output and bring you important savings, as proved by *ratio-delay studies** made before and after installation of VMP MOBILWALLS.

Recent studies of firms who installed VMP MOBILWALLS show—

- Productivity increased as much as 30%
- Delays and lost motion reduced as much as 58%
- Time devoted to distractions and correction of resulting errors reduced as much as 55%
- VMP MOBILWALLS added as much to the work output as could have been added by a 30% increase in employees and payroll!

**Ratio-delay studies* accurately rate operating efficiency. Typical studies showing how VMP MOBILWALLS increase productivity are available on request.

PRODUCTIVE PRIVACY is provided by VMP MOBILWALLS in your office or plant. You can easily move MOBILWALLS anywhere, any time, to suit floor plan changes. Surfaces never chip, warp, or crack—wash clean with soap and water. Colors are scientifically selected to produce a pleasant working atmosphere.

SPEEDY INSTALLATION, without interruption in working routine, is made in a few hours by trained local crews. Modern MOBILWALLS, designed by specialists in metal partitioning, are a tasteful blend of function and good looks. They make a major contribution to efficiency and attractiveness wherever installed.

Better check into VMP MOBILWALLS today. Write to Dept. PE-10 for complete, illustrated literature.

Virginia Metal Products, inc.

ORANGE, VIRGINIA

Subsidiary of Chesapeake Industries, Inc.

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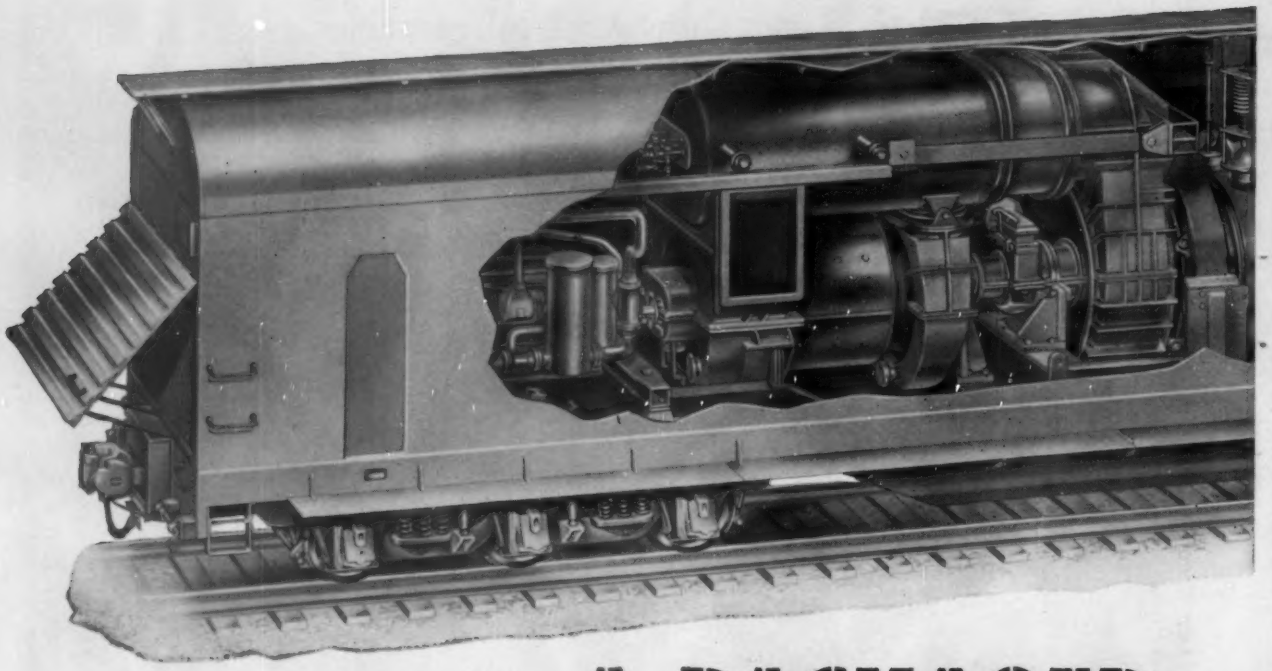
Revolutionary Clark development in mobile power generation



A PACKAGED

KEY FEATURES

1 **COMPLETELY SELF-CONTAINED**
Requires only connection to fuel source and electrical load.
No water nor outside power needed.

2 **ONE-MAN OPERATION**
Simple, pneumatic controls. Complete, built-in, dead front switchgear.

3 **MOVED AT HIGH SPEEDS**
Can be hauled on regular passenger or freight train service. All components specifically designed for mobile operation. Special, heavy duty car.

4 **QUICKLY PLACED IN SERVICE**
No site preparation required. Operates on any reasonably level track.

5 **3-POINT SUPPORT**
Car flexing does not affect alignment of power unit.

6 **DUAL FUEL OPERATION**
Burns wide range of liquid or gaseous fuels simultaneously or individually.

7 **SPLIT SHAFT DESIGN**
No alignment problem. No step-down gears between turbine and load. No physical connection between turbines.

8 **THERMO-ELASTIC DESIGN**
Hot parts expand without stress. No bearing misalignment.

9 **LONG LIFE — LOW TEMPERATURE**
Minimum blade life of 100,000 hours.

10 **AIR COOLED — NO WATER REQUIRED**

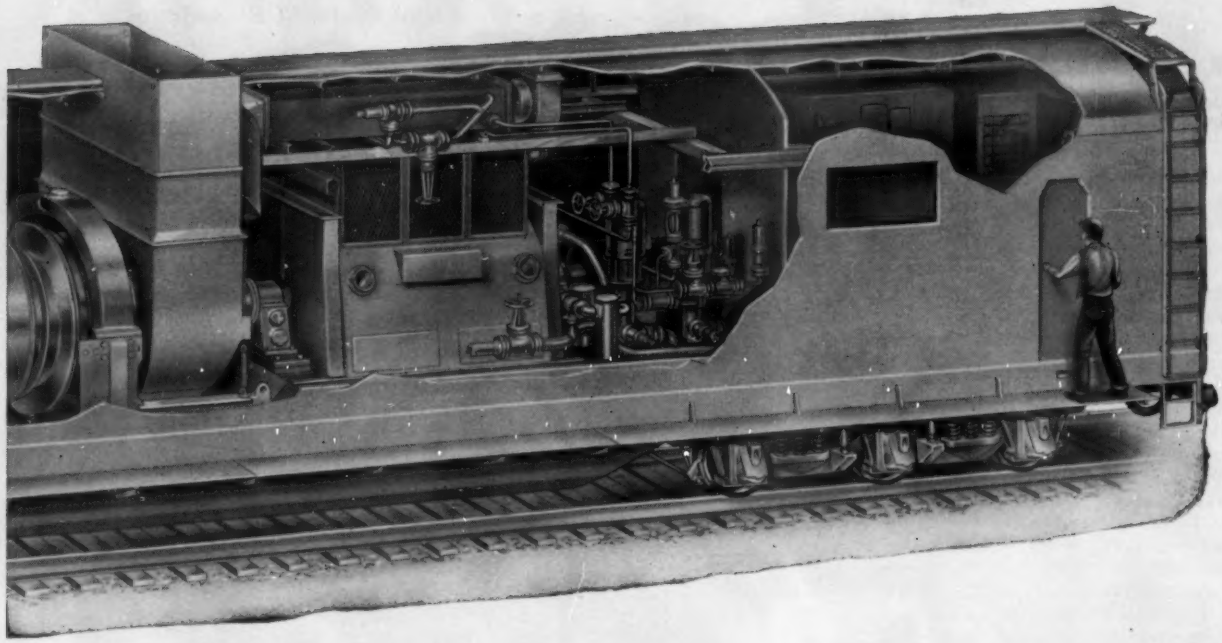
11 **DUAL MULTI-STAGE HIGH AND LOW PRESSURE TURBINES**

12 **LIFETIME SINGLE COMBUSTION CHAMBER**

13 **MINIMUM RADIATION**
All exposed surfaces cool enough to touch.

14 **FLEXIBLE ELECTRICAL CHARACTERISTICS**
Dual frequency. Operates in parallel with existing facilities or independently.

15 **UNUSUAL ACCESSIBILITY**
All parts readily accessible for rapid inspection and servicing.



5500 KW POWER PLANT

Completely self-contained in a single R.R. car

The Navy ordered it. Clark built it — a packaged 5500 KW mobile power plant completely self-contained in a single railroad car for emergency use by the Bureau of Yards & Docks.

Featuring a completely new, Clark designed combustion gas turbine, driving a synchronous generator, the unit is specifically designed as a mobile emergency power station to supply a substantial block of power on short notice. Clearly, this is a development that offers many opportunities to the armed forces, civil defense, public utilities and industry.

Furthermore, the unique gas turbine which drives the generator is extremely well suited as a matching driver for centrifugal compressors serving the gas transmission, refining, process and other industries.

Clark engineers will gladly furnish details and discuss specific applications with you. Complete brochure mailed on request.

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OPERATION AND PRODUCTION pointers for the industrial plant engineer

Edited by H. E. B. Anderson

Maintenance by Design

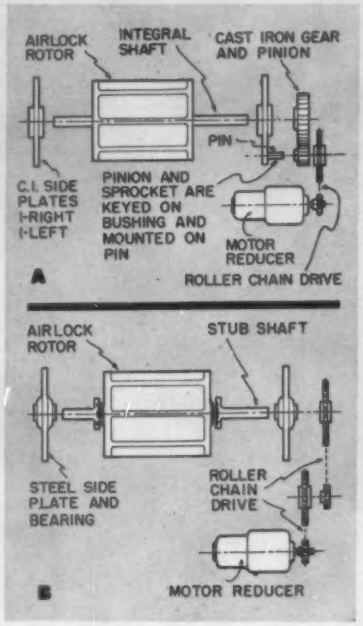
Contributed by E. M. Benjes
Lever Brothers Company

REDESIGN of a rotary air lock under an air powder separation chamber has resulted in a unit that is more rugged, yet more readily repaired when necessary, than was the unit it replaced.

A breakdown, which involved the failure of one side plate, fracture of some of the gears, and the bending of the rotor shaft, precipitated the redesign of the equipment. To replace the broken cast iron side plate, which held the bearings, a steel weldment was designed. A pair of anti-friction take-up bearings was adapted to replace the plain bearings from the original side plate.

To provide the speed reduction formerly afforded by the cast iron gears, an additional roller chain drive was installed. The rotor shaft design was changed to a renewable shaft design, to prevent recurrence of shaft breakage problems. Both shafts on the rotor were machined flush, and a centering spud was machined on each side where the shaft had been. Shafts were machined to replace the original shaft-stubs. Flanged and counterbored, they were easily centered and bolted in place on the rotor.

Application of anti-friction bearings also reduces power loss, and allows a closer tolerance fit at the rotor periphery. This tolerance reduces the infiltration of air.



Original design, A, used cast iron side plates and pinion gears; improved design, B, weldments and roller chain

Generally speaking, design maintenance applied at the time of a breakdown is done at a lower cost than the alteration of equipment which is still operating.

V-Belt Static Lights a Bulb

RESEARCH ENGINEERS of the Dayton Rubber Company, investigating static build-up around V-belts, are currently recommending the use of a 1/25 watt neon glow bulb as an indicator.

If the bulb is held near a moving V-belt that is surrounded by static electricity, the bulb will light.

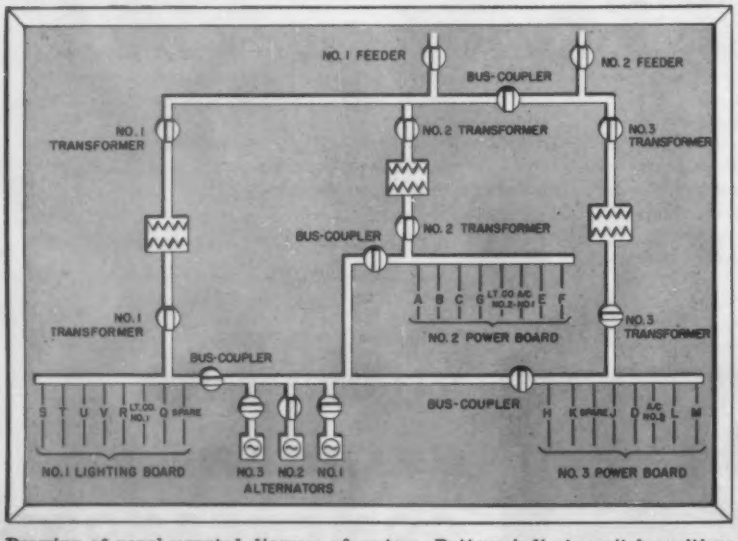
Contrary to public opinion, there will be less static electricity generated during a thunder and lightning storm, or on a damp day, than there will be on a dry day. On dry days, there may be enough static electricity generated to knock the bulb out of the tester's hand. As a safety measure, the engineers recommend attaching the bulb to a pencil or wooden rod.

Flux Cleaning By Magnetics

FOR THE AUTOMATIC separation of iron contamination from used welding flux, Automatic Hardfacing, Inc., in Everett, Washington, has installed an Eriez permanent magnetic pulley. Their successful experience suggests similar benefits in any plant where quantities of a processing material is

(Continued on page 54)

Power System Laid Out On Panel For Ready Reference and Operator Training


NO. 1 FEEDER
BUS-COUPLER
NO. 2 FEEDER
NO. 1 TRANSFORMER
NO. 2 TRANSFORMER
NO. 3 TRANSFORMER
BUS-COUPLER
NO. 2 TRANSFORMER
A B C G LT. CO NO. 1 A/C NO. 2-NO. 1 E F
NO. 1 TRANSFORMER
NO. 2 POWER BOARD
NO. 3 TRANSFORMER
BUS-COUPLER
S T U V R LT. CO NO. 1 Q SPARE
BUS-COUPLER
H K SPARE J O A/C NO. 2 L M
NO. 1 LIGHTING BOARD
NO. 3 NO. 2 NO. 1 ALTERNATORS
NO. 3 POWER BOARD

Drawing of panel-mounted diagram of system. Buttons indicate switch positions

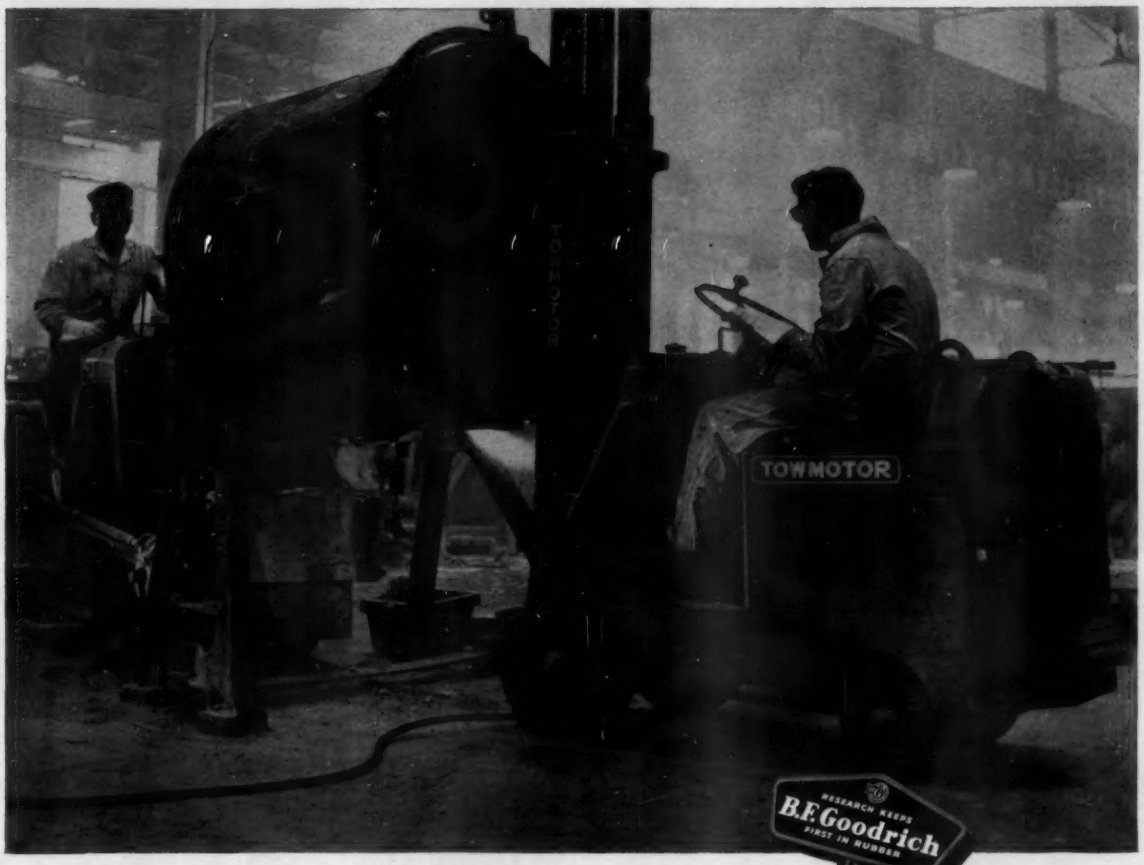
A SINGLE LINE diagram, outlined in raised plywood strips mounted on a baseboard, serves as an excellent training device for power house employees. Installed at the Bristol, England plant of the W.D. & H.O. Wills Company, the diagram also presents a graphic picture of the position of all switches in the system at any given moment.

Connections are indicated by the plywood strips, and switches by turn-buttons. These buttons, which will turn 90 degrees, have a raised bar across their faces, to indicate the position of the switches. For easy identification, bus-coupler switches have a yellow background, instead of the white background of the remainder of the switches. The buttons, ¾ in. in diameter, fit into counterbored recesses in the baseboard, and are pinned through the board. Red and black colors identify separate circuits.

Act now—have a money-saving

B.F.Goodrich

TW TIRE AND WHEEL ANALYSIS made in your plant today!



● You can save as much as 50% on industrial tire costs with the money-saving B. F. Goodrich Tire and Wheel Analysis Plan! Call in your local B. F. Goodrich representative today. He's trained to study your materials handling set-up. He knows the kind of industrial tires—the tread compounds and tread designs—that will give the best service at lowest cost in your type of work. He'll recommend these tires to you. And this service costs you nothing, puts you under no obligation.

Industrial tire users across the country have benefited from the recommendations of the B. F. Goodrich Tire and Wheel Analysis man. They have saved up to 20% on *maintenance costs alone* by following the suggestions he makes. Why not find out now how much the B. F. Goodrich Tire and Wheel Analysis Plan can save *you!*

You can be sure the advice you get from your BFG man will be impartial. He has no axe to grind for any particular type of industrial tire —for B. F. Goodrich makes, and BFG retailers sell, a complete line of industrial tires.

Call your local B. F. Goodrich representative today and ask him to make a free Tire and Wheel Analysis in your plant, or mail the coupon. A special TW Analysis Plan is available for manufacturers of industrial handling equipment.

Specify B. F. Goodrich tires when ordering new equipment

The B. F. Goodrich Company
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OPERATION—PRODUCTION

(O and P begins on page 52)

Belt conveyor, viewed from below, shows accumulation of iron at pulley

usually rendered unfit for re-use, by contamination by iron particles.

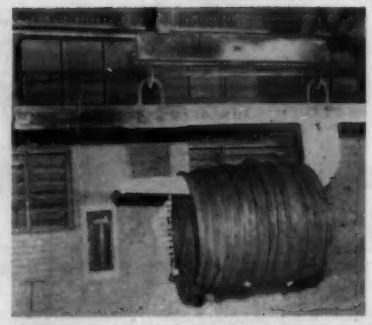
In the operation at Automatic Hardfacing, the unit being resurfaced is revolved while automatic welders build up the worn surfaces. As the welding flux cools and flakes off, mixed with fine iron particles, it is collected in its impure state, and transferred to a bin.

To re-use the flux, the company invested some $1800.00 in recovery equipment—principally an eight inch belt conveyor, on which the impure flux is fed from a small hopper, and a permanent magnetic head pulley, made by the Eriez Manufacturing Co., Erie, Pa. To clean the flux, the operator turns the head pulley by hand crank, continuing the movement until a sufficient quantity of flux is returned to the welder. As the non-magnetic flux passes over the head pulley, it falls into the welding machine, while all iron contamination is held on the belt by the pulley's magnetic field. After the belt has carried these particles past the magnetic field, they fall into a hopper which carries them to a container for disposal as scrap metal.

Alloy Hook Doesn't Pickle

PICKLING of specialty mill products such as stainless steel wire and strip offers a particularly difficult problem because of the extremely corrosive nature of the pickling and cleaning solutions. For instance, in the pickling of stainless steel wire, solutions used include nitric-hydrofluoric acid mixtures, nitric acid, sulfuric acid, and special descaling salt solutions. Depending on the composition of the stainless wire and final properties desired, the pickling solutions are kept at various elevated temperatures.

To support the wire during pickling and cleaning operations, many steel mills utilize pickling hooks cast in type



Cast stainless alloy hook carries coils of steel wire through pickling operation

CN-7M stainless alloy. Because of its high resistance to the corrosive solutions, this stainless alloy assures long life for the casting. The complex shape of the hook, and the severe service to which it is exposed, make integral cast construction more economical than fabrication by other methods.

Nuclear Scanner "Weighs" Paper

INSTALLATION of a nuclear scanning device at Hudson Pulp & Paper Corporation's Palatka, Florida mill will facilitate continuous observation and regulation of the quality of the company's kraft paper.

Sweeping across the paper machine, the scanner emits beta rays that measure the precise basis weight of the

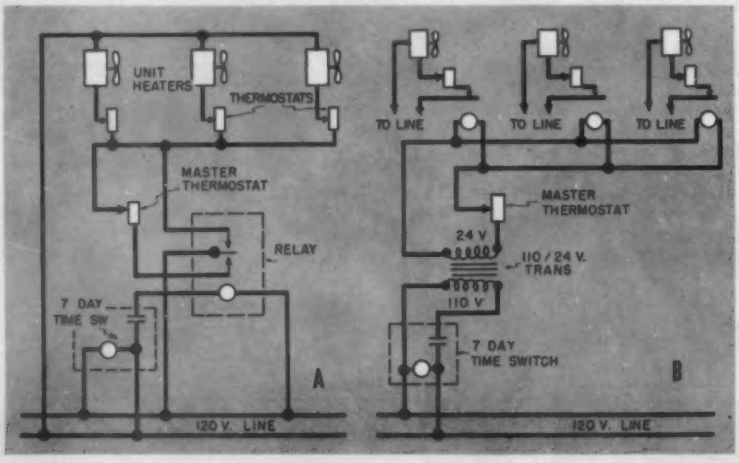
(Continued on page 56)

Automatic Controls for Unit Heater Operation Provide for Economical Utilization

Contributed by Howard T. Bailey, Brillion Iron Works

EFFECTIVE METHODS for automatically dropping plant temperatures during holiday and weekend shutdowns provide a definite advantage over depending on plant personnel to perform these operations at the end of their work period.

Two electrical circuits that will control the temperature in a plant are shown in Figures A and B. The usual working temperature of 70 F is automatically dropped to 50 F during shutdown periods by a combination master thermostat and seven-day time switch.



Single line diagram for wiring unit heaters to provide thermostat control

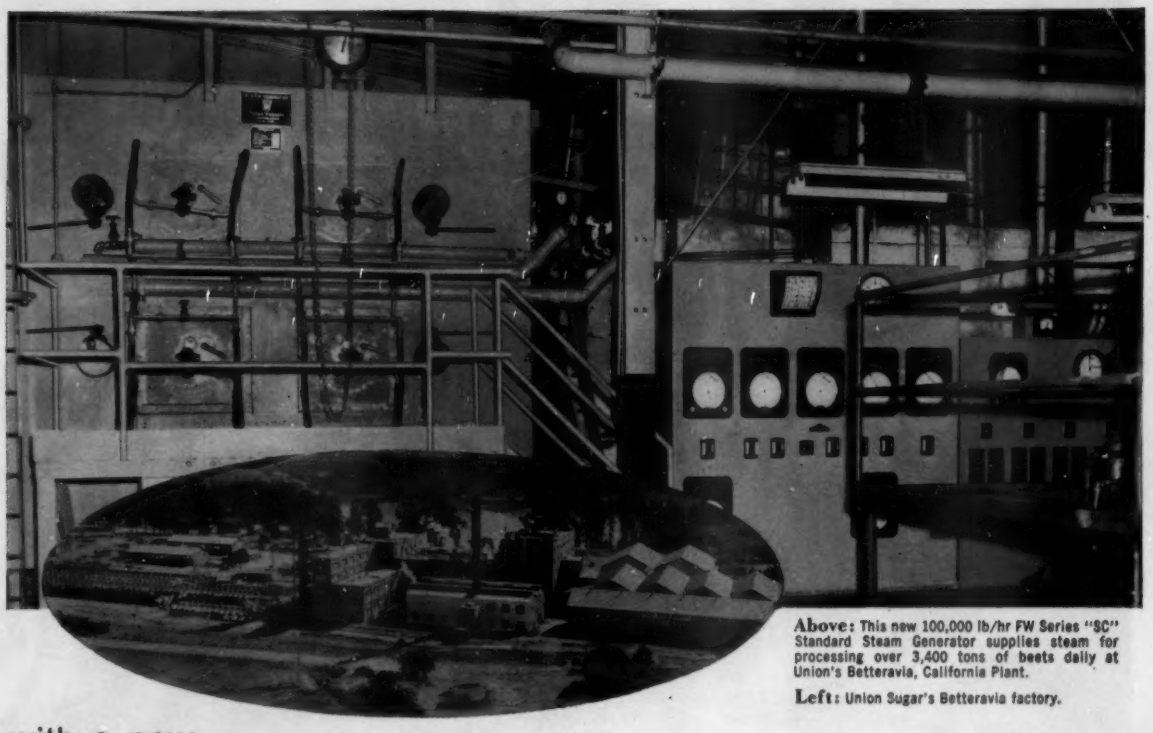
The circuit shown in A is effective only when the unit heaters are powered from the same feeder. Since it does not require the use of relays, it is the lower cost installation of the two.

In Fig. B, each of the unit heaters is controlled individually by a relay and the master thermostat. In this case, the normally closed contacts of the master thermostat are used. On weekends, all of the individual relays are energized through the normally closed contacts of the master thermostat, shutting off the heaters. When the temperature drops to the master thermostat setting, its contacts open and de-energize all of the relays, which turn on the unit heaters.

In this instance, as in Fig. A, the seven-day clock is the basic control, since it is preset to the day and time of any planned shutdowns.

Union Sugar

obtains low-cost steam



Above: This new 100,000 lb/hr FW Series "SC" Standard Steam Generator supplies steam for processing over 3,400 tons of beets daily at Union's Betteravia, California Plant.

Left: Union Sugar's Betteravia factory.

with a new

FW Series "SC" steam generator

This new Foster Wheeler "SC" Series Standard Steam Generator is a part of a continuing modernization and expansion program being carried on by the Union Sugar Division of Consolidated Foods Corporation, a pioneer California beet sugar company.

In selecting this unit, Union has taken advantage of the latest development by Foster Wheeler toward the reduction of industrial steam costs. This new generator embodies advanced design features which result in low installation, operating and maintenance expenses.

Maximum dependability under continuous full-load is assured by such advantages as: completely water-cooled furnace, fully drainable superheater, highly efficient boiler surface arrangement, and unrestricted circulation. The design also provides flexibility in heat recovery equipment, balanced or pressurized firing and steam purifying systems.

Fuels: Oil or gas—*Steam Temperatures:* Saturated to 950F—*Capacities:* 50,000 to 190,000 lb/hr—*Pressures:* to 1500 psi.

For complete information, write for Bulletin B 55-4, *Foster Wheeler Corporation, 165 Broadway, New York 6, N. Y.*

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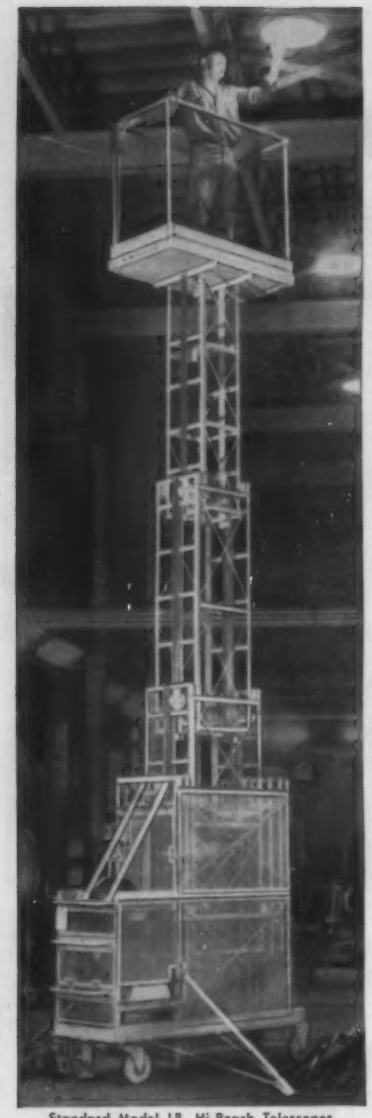

Standard Model LB, Hi-Reach Telescoper. Four heights 20 ft. to 35 ft.

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Safety is our first consideration in building Hi-Reach Telescopers.

For more than a quarter of a century our engineers have constantly improved the mechanical construction of Hi-Reach Telescopers to obtain maximum stability, smooth time-saving lifting action, and dependable performance.

Standard Models available from 10'-9" to 35 ft. high, and custom-built units as high as 100 ft. if you like.

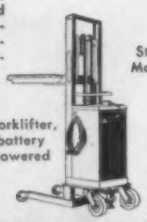
If you have an overhead service problem or need a special material handling machine, Economy can build it. And you can be sure of complete satisfaction in performance.

Economy representatives, trained in engineering, are located in all principal cities. Call one in on your overhead servicing, or material handling problem. Estimates made without obligation.

Write for new Catalog No. 55.

Forty pages of pictures and suggestions for special and standard machines.

Standard model PUL with extended platform for servicing over floor obstructions. Counter-balanced base.



Worklifter, battery powered

Standard Model PUL

Hi-Reach Telescoper, heights up to 100 ft.

ECONOMY ENGINEERING CO.

4527 W. Lake Street, Chicago 24, Ill.
New York Office, 342 Madison Ave., New York 17, N. Y.

For more facts circle 539 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 52)

paper as it comes off the dryers. This information is fed into an electric integrator that automatically regulates

Scanning head (arrow) traverses paper machine to measure weight of sheet

and controls the flow of pulp fed into the machine.

It is expected that the nuclear scanner will regulate the basis weight to a variance of less than two per cent, compared with the commercially acceptable five per cent.

Furnace Gets a Roof

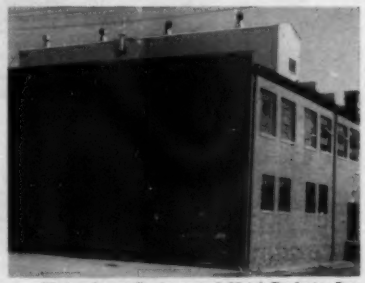


Photo: Armco Drainage and Metal Products, Inc.

To house a new heat treating furnace, without adding an extra floor to the existing building, Monarch Machine and Stamping Co., Des Moines, Iowa, constructed a roof-top steel panelled building, (Steelox) 12 ft wide, 72 ft long

Which Blade to Use?

SELECTION OF band saw blades for metal cutting should be guided by the material to be cut, advise Rockwell-Delta power tool experts. Factors such as the number of cutting teeth, their set and operating speed vary with the particular job to be done.

Slow speed is needed for metal sawing, except when using the friction sawing technique, which uses a high blade speed. For conventional sawing, the blade speed should be in the neigh-

G-E LAMPS GIVE YOU MORE FOR ALL YOUR LIGHTING DOLLARS

How General Electric built a $7.00 bonus into the $3.50 slimline lamp

MORE LIGHT. The picture above was taken by the glow of the chemical piled on the tray. It's the phosphor used inside the General Electric slimline fluorescent lamp to produce light. It's 19% brighter than it was five years ago. Holds its brightness better, too. Result: over the original 6000-hour life period, today's G-E slimline lamp gives 31% more light than the 1950 slimline.

LONGER LIFE. Silhouetted against the glow is a tiny coil of wire. It's the cathode that carries electricity to operate the lamp. It's coiled three times. It holds more starting chemical and holds it longer. This cuts down on early burnouts. And this is the main reason why today's General Electric slimline fluorescent lamp lasts 7,500 hours, compared to the old lamp's life rating of only 6,000 hours.

COSTS LESS. With the value going up like this, the price of today's General Electric slimline fluorescent lamp has actually gone down. Less than a year ago, a price reduction brought case-quantity buyers a net saving of 17¢ per lamp.

To add it all up, counting lamps, labor and electricty; the amount of light G-E slimline gives today would have cost *$7.00 more* only five years ago!

For more facts on how General Electric gives you more for *all* your lighting dollars, write for a free 16-page Progress Report to Lamp Users: Large Lamp Department, General Electric, Dept. 482-PE-10, Nela Park, Cleveland 12, Ohio.

Progress Is Our Most Important Product

GENERAL ELECTRIC

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Twin Disc Model 21 HCS Fluid Coupling, shown installed between 100 hp 1200 rpm motor and secondary crusher owned by Shawinigan Chemicals, Limited, Carbide Division, Shawinigan Falls, Quebec, Canada. Twin Disc Fluid Couplings are provided in 10 models, with all input, output variations, for motors and engines from ¾ to 850 hp.

Fluid drive on crusher SAVES $3,000 A YEAR

With a secondary crusher in their Carbide Division, Shawinigan Chemicals, Limited, was having a $3,000-a-year maintenance headache.

The ailment? *Mechanical connection.* Uneven loading—inescapable on this operation—was pulling the motor down to a stall condition, where it delivered locked-motor torque and severely damaged the crusher.

The cure? *Fluid* connection . . . a Twin Disc *twin-circuit* Fluid Coupling, installed between the 100 hp 1200 rpm motor and the crusher. Smooth, automatic, fluid "slip" *absorbs* the shocks—keeps the motor from pulling down—while gradually, steadily picking up the load. Maintenance costs since installing the Fluid Coupling: *none.*

You can do the same for powered equipment in your plant. Write Twin Disc, Dept. DS, Racine, Wis., *today* for Fluid Coupling Bulletin 144-D.

TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES
TWIN DISC
Fluid Couplings

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OPERATION PRODUCTION —

(O and P begins on page 52)

borhood of 200 surface feet per minute.

Blades for cutting thin metal should be selected so there will always be at least two teeth in contact with the edge of the work. If teeth are allowed to straddle the work, they will probably be torn off.

Three different styles of set are commonly used for metal cutting blades. Blades with every tooth set, alternating right and left, can be used for cutting all of the softer metals. "Regular" or "raker" set blades have one unset raker tooth to each pair of set teeth, the raker tooth keeping the cut clean. The "wavy" set blade has teeth set in groups, one set of teeth forming a wave to the right, the next set forming a wave to the left.

For the small or general shop, a good selection of blades would include 14, 18 and 24 teeth per inch, the 18-tooth regular set blade being best for all-around work.

For special work, the accompanying specifications are suggested as a guide. The recommendations are based on

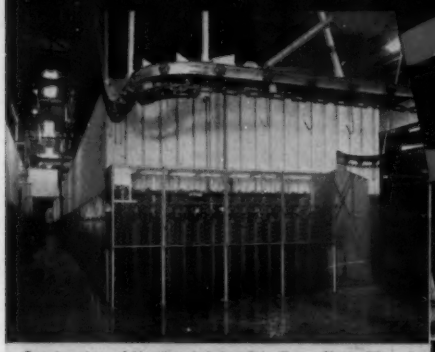
Table illustrates best choices of band saw blade for cutting various materials

MATERIAL	SPEED fpm	TEETH	SET*
Aluminum-alloy gates	125	8-10	ETS
Aluminum sheets	2200	8-10	ETS
Asbestos sheets	125	8-10	ETS
Babbitt	340	10-14	Reg
Bakelite	340	5-10	ETS
Brass; cast, soft	340	12-14	ETS
Brass; cast, hard	125	18	Wavy
Brass sheets, tubing	340	14-18	ETS
Bronze; manganese, etc.	125	10-14	Reg
Bronze mouldings	175	18-24	ETS
Builders board	2200	12-14	ETS
Brake lining	125	8-12	ETS
Carbon tool steel	80	14	Reg
Cast iron	125	14	Reg
Cold-rolled steel	175	14	Reg
Copper	175	10-12	ETS
Drill rod	80	14	Reg
Fiber	340	8-10	ETS
High-speed steel	80	14	Reg
Hose; canvas, rubber	2200	8-10	Wavy
Hose; metallic	250	18-22	Wavy
Iron bars; mach. steel	175	10-14	Reg
Iron sheets	175	18-22	Wavy
Malleable iron	175	12-14	Reg
Plymetal	175	14	ETS
Mica	175	10-14	ETS
Monel metal	125	10-12	Reg
Nickel steel	80	12-14	Reg
Pipe	125	18-22	Wavy
Radiator cores	340	18-22	Wavy
Rubber; hard	340	10-14	ETS
Slate	80	10-14	ETS
Steel mouldings; special shapes	125	18-24	Wavy
Steel tubing	125	18-24	Wavy
Transite	175	14-18	Reg

*ETS—Every Tooth Set; Reg—Regular Set; Wavy—Group Set

COMPLETE *Finishing* SYSTEMS

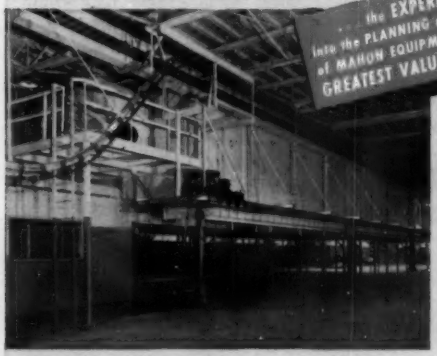
. . . for ENAMELS • LACQUER • PAINT • VARNISH



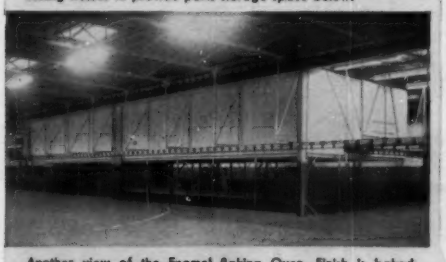
Exterior view of Ventilated Active Drip Zone. Clean, Filtered Air is Supplied to this enclosure. Fume-laden air is exhausted.

View showing glass in one side of Inactive Drip Zone where parts may be seen prior to entering Baking Oven.

View of Mahon Flow-Coating Equipment at Chrysler Corporation of Canada, Limited. This is part of a Complete Mahon Finishing System for Coating Black Enamel Parts.



View of Mahon 450° Enamel Baking Oven. Oven is built against ceiling trusses to provide parts storage space below.



Another view of the Enamel Baking Oven. Finish is baked for 20 minutes at 450° in this 80 Ft. x 24 Ft. Mahon Oven.

. . . the EXPERIENCE that goes into the PLANNING and ENGINEERING of MAHON EQUIPMENT is the item of GREATEST VALUE to YOU!

Black Enamel Parts at CHRYSLER CORPORATION of CANADA, LIMITED, are FLOW-COATED in MAHON FINISHING SYSTEM!

In addition to the body finishing system at the Windsor plant of Chrysler Corporation of Canada, Limited, Mahon also installed a complete finishing system for black enamel parts. This is a Flow-Coating System which includes a Mahon Flow-Coating Machine, a Ventilated Active Drip Zone, a Ventilated Inactive Drip Zone, and a 450° Finish Baking Oven with storage space below. Two Enamel Mixing Tanks and a Solvent Tank are provided outside the enclosure. The recirculating unit is equipped to automatically maintain the enamel at a specific temperature in the Flow-Coating Chamber. This is a typical Mahon Flow-Coating System, complete in every detail —automatic from start to stop. If you have a finishing problem, or are contemplating new finishing equipment, you will find that Mahon engineers are better qualified to advise you on both methods and equipment requirements . . . and better qualified to do the all-important planning and engineering of equipment—which is the key to fine finishes at minimum cost. Whether your job is to be Flow-Coated, Dip-Coated, or Spray Painted either Manually or by Electrostatic Process, you will find that Mahon equipment will serve you better, because it is engineered better and built better for more economical operation over a longer period of time. Mahon will do a complete job for you on one contract—undivided responsibility for the entire system insures proper coordination and safeguards you against complications which can upset your production schedules. See Mahon's insert in Sweet's Plant Engineering File, or write for Catalog A-656.

THE R. C. MAHON COMPANY • Detroit 34, Michigan

SALES ENGINEERING OFFICES In NEW YORK AND CHICAGO

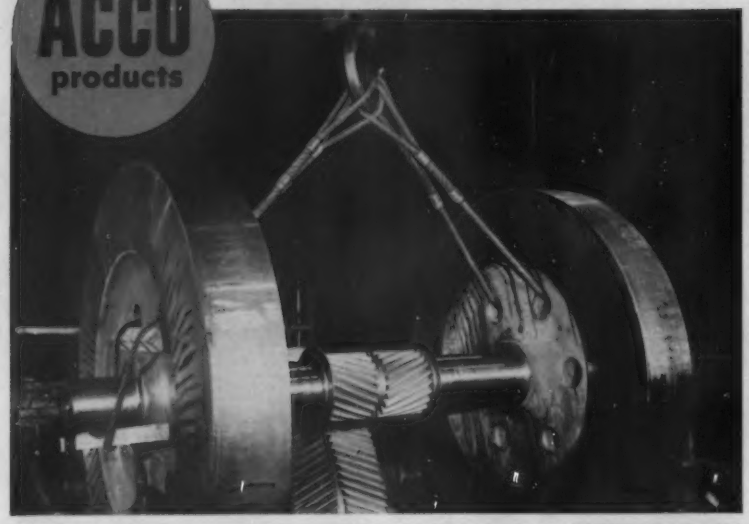
Engineers and Manufacturers of Complete Finishing Systems—including Metal Cleaning, Pickling, and Rust Proofing Equipment, Hydro-Filter Spray Booths, Dip and Flow Coaters, Filtered Air Supply Systems, Drying and Baking Ovens, Cooling Tunnels, Heat Treating and Quenching Equipment for Aluminum and Magnesium, and other Units of Special Production Equipment.

MAHON

For more facts circle 542 on Reply Card

This 34-Ton Load...

ACCO products



badly kinked these Braided Slings...

...didn't bother these Cable-Laid Slings

Here's Why:

Because these ACCO *Registered* CABLE-LAID slings combine the flexibility of manila rope with the strength of steel.

The secret of the CABLE-LAID sling is in the construction of the rope. It's a combination of six wire ropes laid around a special steel center to give you a rugged steel body which has:

- **Freedom from Crankiness**
- **Extreme Flexibility**
- **Resistance to Kinking**

With their patented DUALOC endings these CABLE-LAID slings are tops in ease of handling . . . resist abuse . . . and give you longer sling life which reduces lifting costs. And these slings are ACCO *Registered*—with all the advantages that make this specification the standard of efficiency and safety.

See your ACCO Registered distributor or write our Wilkes-Barre, Pa., office today

ACCO

TRADE MARK

Wire Rope Sling Department
AMERICAN CHAIN & CABLE

for Better Value

Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Houston, Los Angeles, New York, Odessa, Tex., Philadelphia, Pittsburgh, Portland, Ore., San Francisco, Bridgeport, Conn. • In Canada: Dominion Chain Co., Ltd., Niagara Falls, Ont.

For more facts circle 543 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 52)

average conditions, and may have to be modified slightly to fit special applications.

Squeezer-Punch Conversion

AN ATTEMPT to break a production bottleneck at Martin produced a method less costly than the one that it was designed to supplement. Overloaded facilities were unable to meet the demand for drilling small holes in contoured sheet metal parts that could not be stack-drilled or pierced on a punch press.

Converted rivet squeezer is mounted on a bench to function as a pierce punch

Several surplus rivet squeezers were taken from storage and converted into piercing presses, to provide the necessary extra capacity. The rivet squeezers were provided with anvils, pierce punches and bases for mounting them vertically on a work bench. Standard drill templates are used, with no drill bushings.

Production schedules are being met and considerable savings are resulting from the higher speed of piercing as compared to drilling.

Swiveling Mandrel for Tube Bending

TUBE BENDERS at Temco Aircraft Corp., Dallas, Texas, are using a ball-type mandrel that costs less, sets up more quickly and forms more efficiently than conventional mandrels.

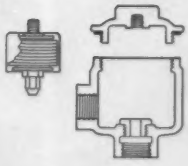
The tool is similar in appearance to other ball-type mandrels, with dished-out steel hemispheres nested in series on the end of a shank, making a mandrel extension that curves in conformance with the tubing bend.

In conventional tools, the spheres are attached with links which allow the device to swivel in only one direction, but in Temco's version, spheres and shank are strung on a length of

STEAM TRAP

Quality

Just 3 quality parts—thermostatic bellows, body, cap. Simple, positive action. Won't leak!



Nicholson quality . . . that gives you the extra strength, extra capacity, extra *stamina* required for severest plant service. Nicholson quality pays off, when it comes to discharging condensate and air from steam lines . . . most efficiently, dependably, economically.

- **Powerful valve action—big husky bellows.**
- **Positive shut-off—finely ground valve and seat.**
- **High capacity—large diameter orifice.**
- **Rigidly tested—on actual steam lines.**

When less than best won't do, specify Nicholson. Send for *Catalog 953*.

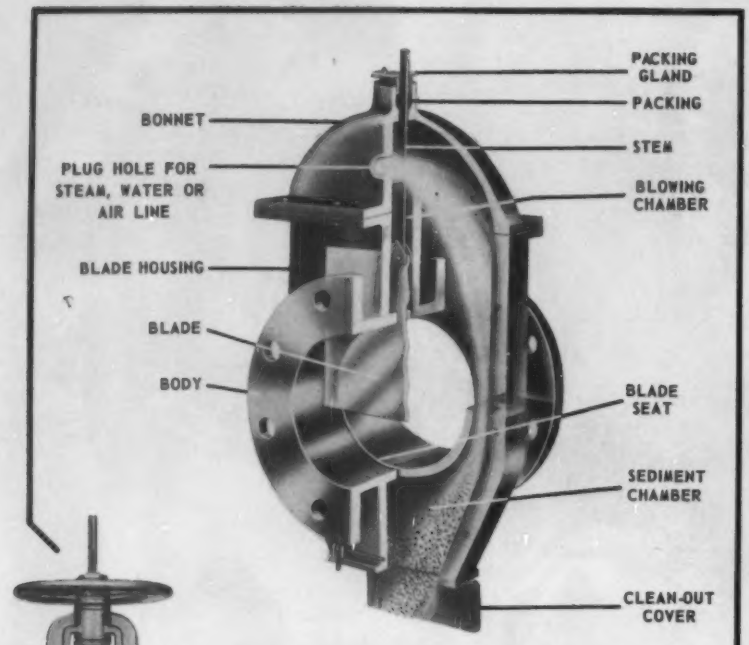
NICHOLSON

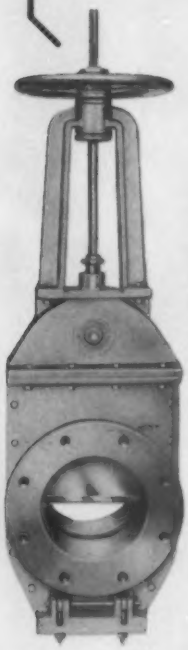
W. H. NICHOLSON and Company

TRAPS • VALVES • FLOATS • METAL PARTITIONS

14 OREGON STREET, WILKES-BARRE, PA. • SALES AND ENGINEERING OFFICES IN 58 PRINCIPAL CITIES

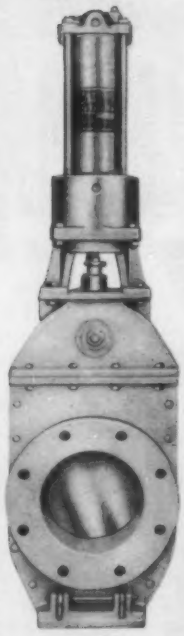
For more facts circle 544 on Reply Card





KWIKLEEN
Heavy Duty

The Valve That's Easy to Clean without Removing from Pipe Line



The ideal valve for fly ash, powdered coal feed to burners, coal to crushers, soot blowers, liquids and gases with high solids content that clog ordinary valves. Combines full flow area, minimum pressure drop, quick control and easy, quick cleaning, blowing or washing out, without dismantling.

Write for Bulletin No. 508

W. S. ROCKWELL COMPANY
BUTTERFLY VALVES • SLIDE VALVES • AUTOMATIC VALVES
2925 ELIOT STREET • FAIRFIELD, CONN.
Sales Representatives in Principal Cities
For more facts circle 545 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 52)

3/16-in. cable. A shank-type terminal is swaged on one end of the cable, and a ball terminal is swaged on the other end. This construction permits the mandrel to swivel in any direction, eliminating the need for precise positioning.

Fabrication is also simplified with

Ball-and-shank construction of the tube bending mandrel is shown by operator

the cable, and four mandrels have been fabricated at a cost of about $200.00 each.

Set-up time is reduced about 15 per cent with the free-swiveling mandrel, since it readily conforms to the bend in the radius block. The mandrels are in regular use at Temco, bending 2-in., 2½-in. and 3-in. OD tubing.

Elevator?—Cut a Hole in the Floor

With the truck entrance in the basement, outsize "trapdoor" in operating floor simplifies vertical transportation. Overhead crane unloads truck, spots equipment on operating floor at GE's Metals and Ceramics research building

7 benefits received by switch to STANOSTAMP *Compound C*

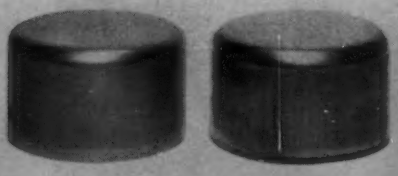
Jagemann Stamping Company, Manitowoc, Wisconsin, benefited seven ways by switching to STANOSTAMP Compound C. Finished ferrules drawn from 19 gauge cold roll steel were being badly scored. At the same time dies were being scratched and excessive heat experienced in the press. Standard Oil lubrication specialist R. E. O'Brien suggested STANOSTAMP. The result:

1. Production increased 20%
2. Die maintenance reduced 30%
3. Spoilage reduced
4. Finish improved
5. Galling minimized
6. Cooler machine operation
7. Washability improved

The results add up to this: There is a combination in the field of industrial lubrication that is hard to beat. It is (1) Standard Oil lubrication specialists capable of giving technical help and (2) Top quality products *that deliver results.*

STANOSTAMP Compound C is a water emulsifiable paste for heavy drawing operations. It contains an inert, non-abrasive mineral filler for protection of dies and work, is readily cleaned from work in conventional washing equipment. In the Midwest, your nearby Standard Oil lubrication specialist will be glad to tell you more about STANOSTAMP. Call him. Or contact: Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

Father and son inspect ferrules. William P. Jagemann (left), President, and son William T. Jagemann note improved finish on work produced using STANOSTAMP.



Air hose ferrules. One at right produced before switch to STANOSTAMP, one at left produced after conversion to this forming compound. Scoring of dies as well as work occurred before switch.

STANDARD OIL COMPANY
(Indiana)

STANDARD

For more facts circle 546 on Reply Card

NEW
REMINGTON STUD DRIVER
Interchangeable barrels for
¼" and ⅜" studs
Operator can change from one barrel to the other in seconds, right on the job! No time lost in going from medium- to heavy-duty work—no need for *second* tool!
A squeeze of the trigger and the job is done!
Anchoring wood furring to steel . . . steel angle to concrete
Compact tool can be used overhead, in tight places—anywhere a man can go. No outside power source required!

tool cuts costs on all stud fastening jobs!

with the Double-Duty REMINGTON STUD DRIVER

You can anchor both ¼" and ⅜" studs in steel or concrete... instantly!

Here's the first cartridge-powered tool that can cut your costs on practically all construction fastening—light, medium and heavy duty. It's the new Model 455 Remington Stud Driver!

The secret of this amazing versatility lies in the tool's construction. *Two* sizes of studs can be used—¼" and ⅜". Changeover in barrels takes only 90 seconds *right on the job*. With either size, an operator can set up to 6 studs per minute . . . anchor conduit clips, wood sections, steel frames and many more fixtures with a squeeze of the trigger!

What powers the Stud Driver? Remington 22 and 32 caliber cartridges for the ¼" and ⅜" studs respectively. For special medium-duty applications, the smaller cartridge may be used with the larger stud, giving an extra-strong fastening at a saving. Every stud is driven arrow-straight, whatever the combination.

GET ALL THE FACTS about this new, useful fastening tool that goes anywhere, works anywhere—without wires or cables, hammering or predrilling. The Model 455 Remington Stud Driver makes the toughest fastening job a one-man, one-tool job and saves you time and money with every application! Just clip the coupon below for full details.

"If It's Remington—It's Right!"

Remington DUPONT

MAIL THIS COUPON TODAY!

Industrial Sales Division PE-10
Remington Arms Co., Inc., Bridgeport 2, Conn.

Please send me your free booklet which shows where and how to use the cost-saving Remington Stud Driver fastening method.

Name_____ Position_____

Firm_____

Address_____

City_____ State_____

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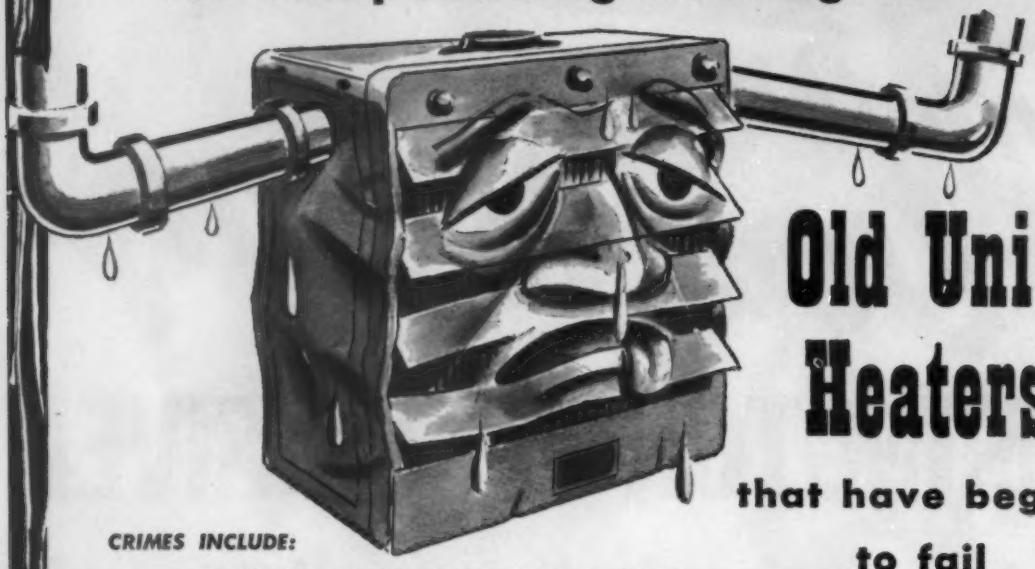
WANTED

for compounding heating costs



Old Unit Heaters

that have begun to fail

CRIMES INCLUDE:

- **Stealing costly maintenance man-hours**
- **Production holdups**
- **Grand larceny of heating efficiency**

REWARD Modine's new liberal exchange plan

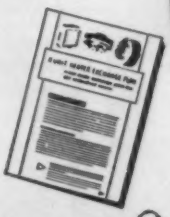
To protect you against the costs and hazards of obsolescence, Modine has established a liberal exchange or trade-in plan. It provides for the exchange of old unit heaters for new Modines at a favorable cash allowance. Now is the time to take advantage of this plan and be ready for the coming heating season.

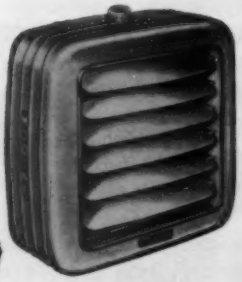
It pays to standardize, too

Yes, leading industrial firms have found that they get additional savings when they standardize on Modine Unit Heaters as a result of (1) simplifying purchasing and installation; (2) speeding routine servicing; (3) having the wide-spread parts interchangeability.

NEW FREE BOOKLET DETAILS REPLACEMENT PLAN

Before you repair or replace any unit heater, get the booklet — "A UNIT HEATER EXCHANGE PLAN". Ask your representative . . . or write to Modine Mfg. Co., 1563 DeKoven Ave., Racine, Wisconsin.





Modine special corrosion-resistant HCR Models available under plan

Modine offers a specially-built line of premium units for systems having severe internal corrosion problems. These models retain the light weight and top performance of standard Modines.

Modine
UNIT HEATERS

SU-1275

For more facts circle 548 on Reply Card

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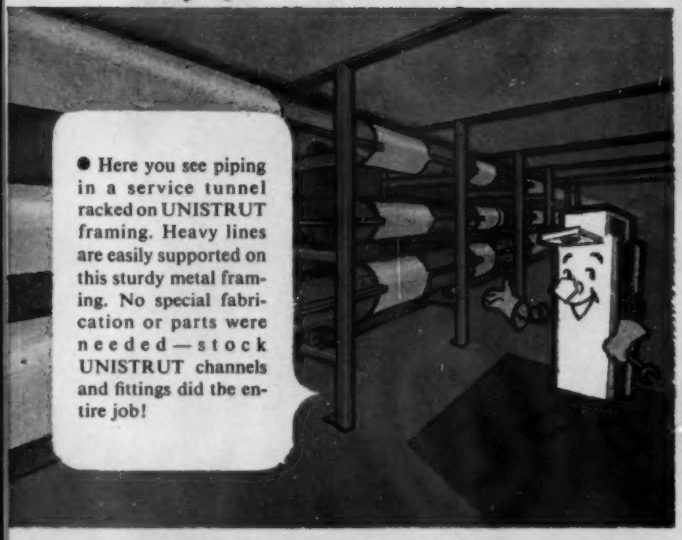
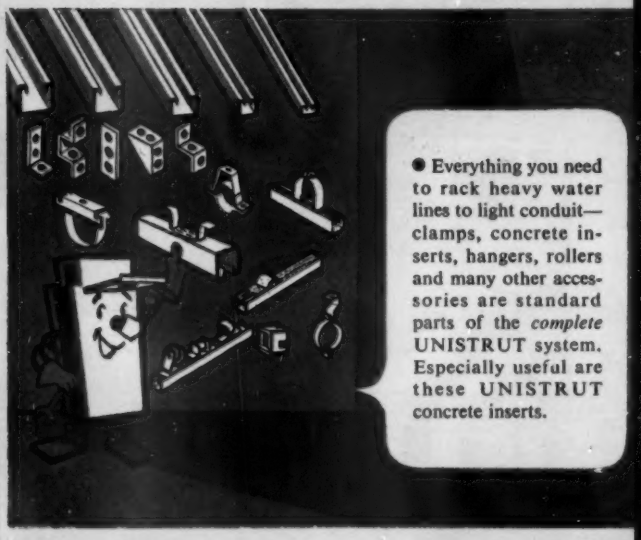
"The Sky's The Limit"

—when you build with UNISTRUT®

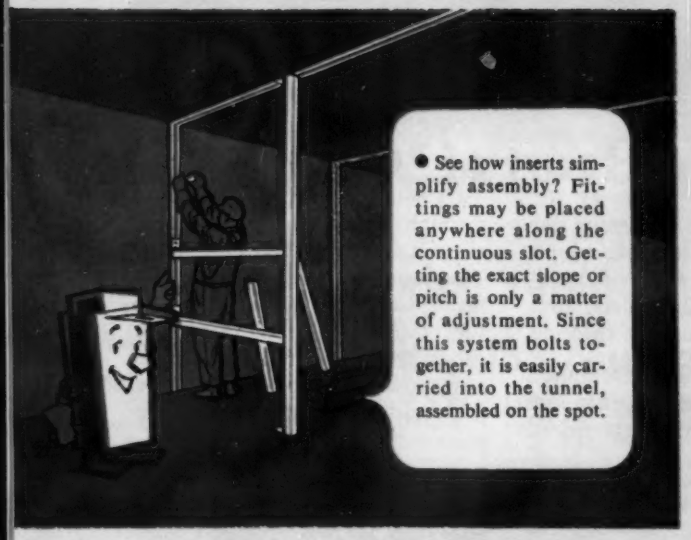
Mr. Strut simplifies pipe racking with cost-cutting UNISTRUT® framing



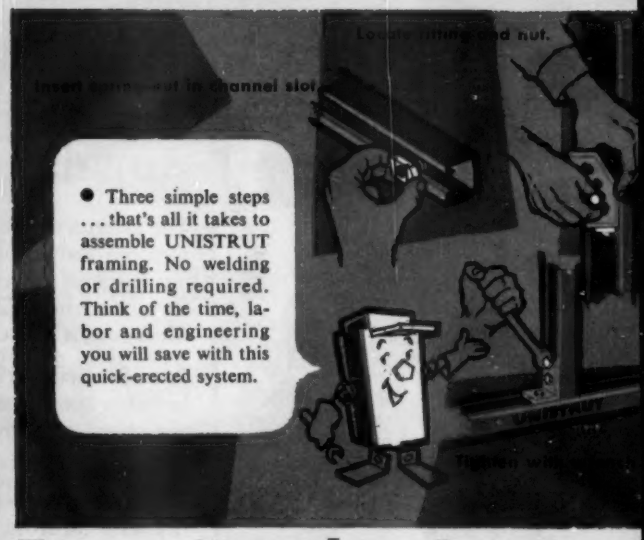
● Here you see piping in a service tunnel racked on UNISTRUT framing. Heavy lines are easily supported on this sturdy metal framing. No special fabrication or parts were needed—stock UNISTRUT channels and fittings did the entire job!



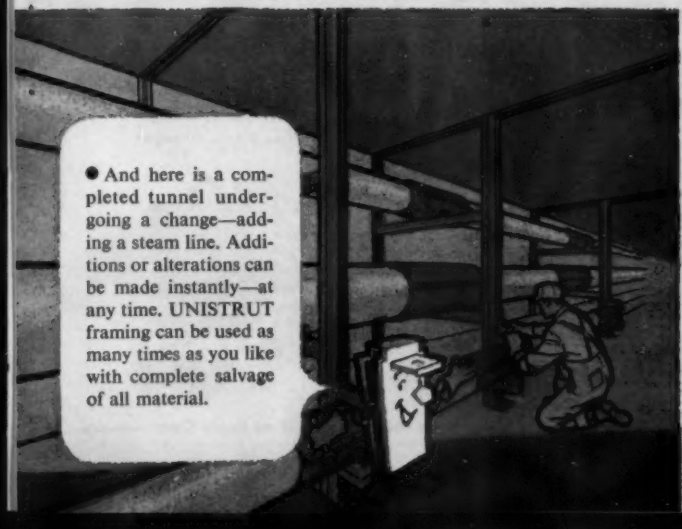
● Everything you need to rack heavy water lines to light conduit—clamps, concrete inserts, hangers, rollers and many other accessories are standard parts of the *complete* UNISTRUT system. Especially useful are these UNISTRUT concrete inserts.



● See how inserts simplify assembly? Fittings may be placed anywhere along the continuous slot. Getting the exact slope or pitch is only a matter of adjustment. Since this system bolts together, it is easily carried into the tunnel, assembled on the spot.



● Three simple steps ... that's all it takes to assemble UNISTRUT framing. No welding or drilling required. Think of the time, labor and engineering you will save with this quick-erected system.



● And here is a completed tunnel undergoing a change—adding a steam line. Additions or alterations can be made instantly—at any time. UNISTRUT framing can be used as many times as you like with complete salvage of all material.

Free Catalog!

Send today for your free copy of the 78-page catalog No. 700. Shows countless examples of how to rack, frame, suspend and support all kinds of mechanical and electrical equipment.

U. S. Patent Numbers

2327587	2541908	2329815	2345630
2363382	2696139	2380379	2405631

Other patents pending

UNISTRUT PRODUCTS COMPANY
1013 W. Washington Blvd.
Chicago 7, Illinois

Dept. G-10

Please send without obligation items checked below:

☐ Catalog No. 700 ☐ UNISTRUT sample

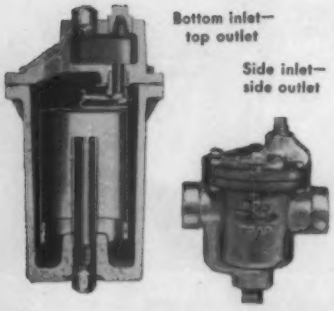
Name.....

Company.....

Address.....

City.....Zone.....State.....

The Steam Trap with a Heart of "Gold"...



Corrosion- and wear-resistant materials; "frictionless" leverage; precision workmanship — add up to LOW MAINTENANCE.

The exterior of the Armstrong trap pictured above sure looks rough, but inside it has a heart of "gold" for its owner, Chemicals, Inc., Chicago, makers of zinc chloride.

Fuel Saving—coal consumption has been cut ½ carload per month since installing Armstrongs to drain kettle coils.

Time Saving—processing time has been cut from 5 days down to 3 days on one zinc chloride tank since installing an Armstrong trap on each of its three coils.

Maintenance Saving—occasionally holes are eaten right through submerged steam coils, allowing acid to get into traps. The stainless Armstrong mechanisms have withstood this abuse successfully. Trap maintenance generally has been negligible. The trap shown above has been on the job working perfectly for five years without repairs.

Take a tip from Mr. Stanley Nykiel, plant operator, who says *"I've tried other kinds, but Armstrongs work best."* Call your local Armstrong Representative (see classified directory or Thomas Register) or write:

ARMSTRONG MACHINE WORKS
912 Maple Street • Three Rivers, Michigan

Application Engineered

ARMSTRONG STEAM TRAPS

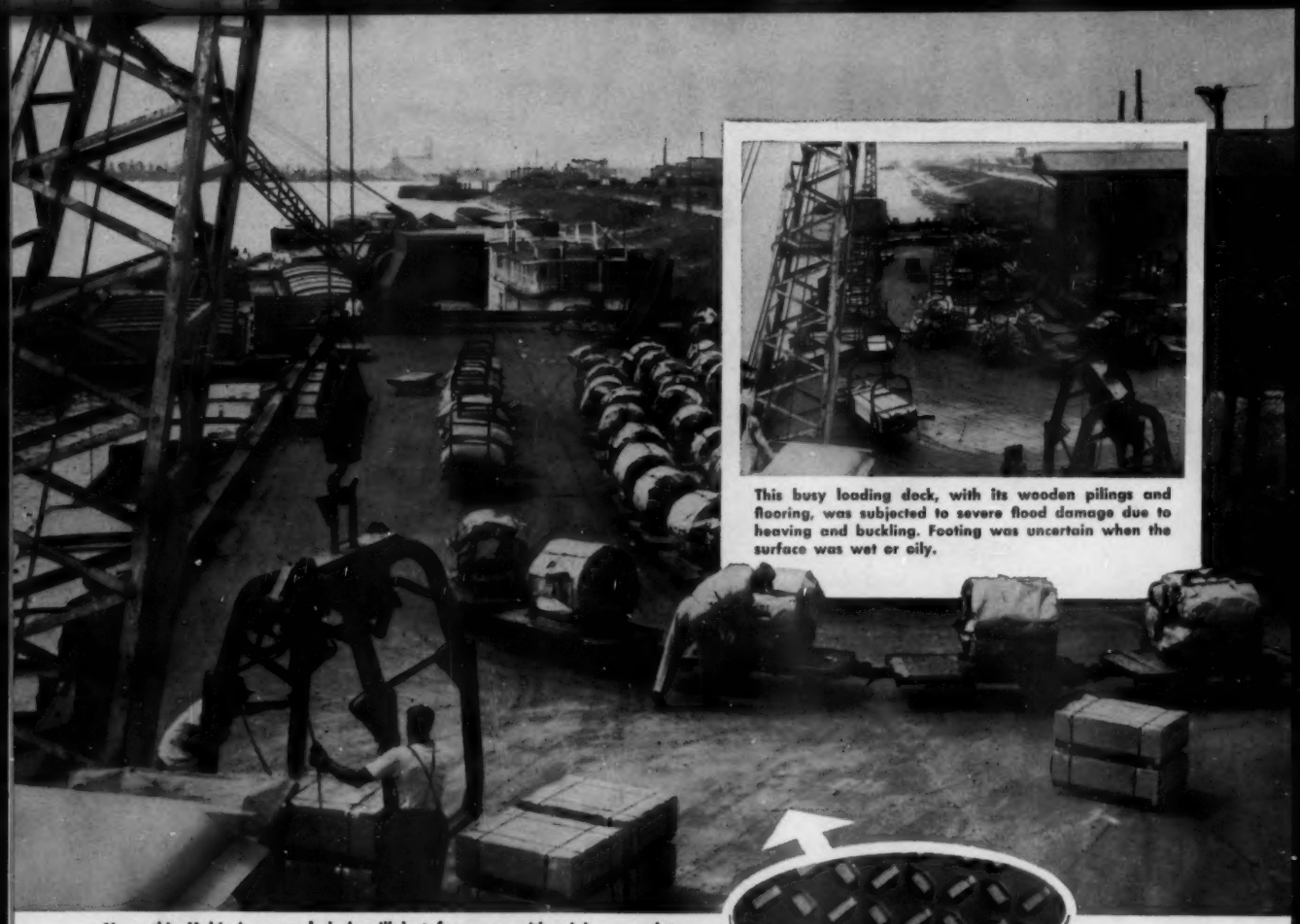
SEND FOR CATALOG J

The 44-page Steam Trap Book gives complete trap data and prices plus useful selection, installation and maintenance information. Armstrong traps also catalogued in Sweets and Chemical Engineering Catalog.

513

For more facts circle 550 on Reply Card

For more facts circle 551 on Reply Card →



This busy loading deck, with its wooden pilings and flooring, was subjected to severe flood damage due to heaving and buckling. Footing was uncertain when the surface was wet or oily.

Now, this Multigrip-covered dock will last for years with minimum maintenance. Evenly spaced "safe-tread" risers give sure-grip traction plus simplified cleaning and exceptional drainage. Permanent support is given by USS H-Beam Bearing Piles.

Dock flooring replaced **once and for all**

with USS Multigrip Floor Plate

Periodically, the waters of the mighty Mississippi rise . . . causing considerable damage to riverside loading docks. The force of these turbulent flood waters buckles, and often collapses, wooden pilings and flooring. Damage like this means expensive repairs, as well as costly delays in loading operations. Such was the case with a busy dock owned by Mississippi Valley Barge Line Company.

Flood losses and resulting delays were eliminated when Stupp Brothers Bridge and Iron Co. of St. Louis, and Massman Construction Company, Kansas City, Mo., used U.S. Steel Multigrip Floor Plate to renovate this dock, which has already had the sub-structure replaced with steel bearing piling. Now, Multigrip Floor Plate, with flat-topped, "safe-tread" risers, will give many years of sound support plus sure-grip traction for feet and the small diameter wheels on fork trucks and freight dollies.

Indoors or out, USS Multigrip Floor Plate is a wise investment in long-term plant safety. Each "safe-tread" riser with its clean, flat top, acts as an accident stopper in danger areas. Because Multigrip is made of tough steel, it gives extra years of low maintenance service in heavy traffic areas. Multigrip is available in large plates (cutting installation waste) and may be bent or formed for structural use.

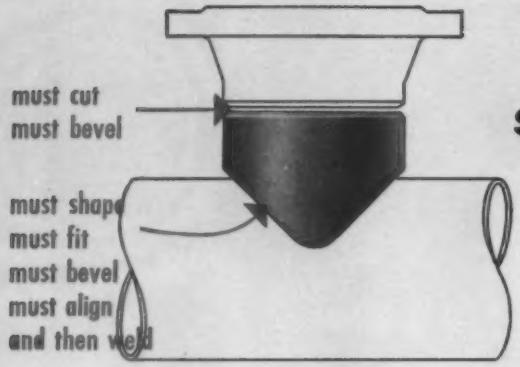
UNITED STATES STEEL CORPORATION, PITTSBURGH
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.
UNITED STATES STEEL SUPPLY DIVISION, CHICAGO
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS multigrip

FLOOR PLATE

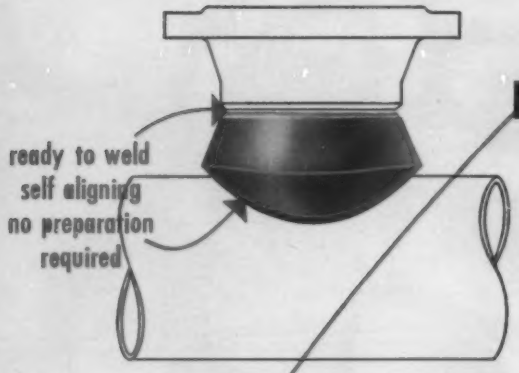
Sold by leading distributors from coast to coast

UNITED STATES STEEL



short nozzles

don't pay...



Bonney Weldolets

do!

Even on low pressure piping . . . avoid non-productive preparation time . . . SPECIFY and USE WELDOLETS

No joint preparation is required for *either* weld of the Weldolet, whereas considerable preparation is required for *both* welds of the miter branch construction.

The integral reinforcement of the Weldolet Welding Fitting has established it as an ideal method of constructing branch connections on high pressure and/or high temperature piping. This feature is *bonus insurance* on low pressure piping where the Weldolet is easier and more economical to use than preparing the two ends of a short unreinforced nozzle.

BONNEY

WELDING FITTINGS DIVISION

FORGE & TOOL WORKS

727 Meadow St., Allentown, Penna.

For more facts circle 552 on Reply Card

For more facts circle 553 on Reply Card →

Problem:

How would you protect this key motor?

STOCK A COMPLETE MOTOR?	STOCK A COMPLETE ARMATURE?	STOCK ARMATURE COILS?	STOCK NO CRITICAL PARTS?
☐	☐	☐	☐

TURN PAGE AND SEE G.E.'S Productive Maintenance ANSWER

GENERAL ELECTRIC

HERE IS A TYPICAL PARTS PROTECTION ANALYSIS

(This evaluation is based on the failure of a part which requires the longest repair time, such as armature coils)

	NO CRITICAL PARTS STOCKED	ARMATURE COILS STOCKED	COMPLETE ARMATURE STOCKED	COMPLETE MOTOR STOCKED
REPAIR TIME	10 days to make coils X	6 days to rewind armature X	7 hours to install new armature	3 hours to replace motor
TOTAL DOWNTIME COST	$168,000	$100,800	$4,900	$2,100
COST OF PARTS PROTECTION	0	Coils: $4,664	Armature: $25,600	Motor: $46,000
COST OF REPAIR	$12,730	$5,900	Installation: $850	Installation: $360
TOTAL FAILURE COST	$180,730	$111,364	$31,350*	$48,460*

X Add disassembly, assembly and transportation time to actual time.

* Add repair cost, on straight time basis, of failed unit.

THIS IS AN EXAMPLE—taken from an actual case history—of how you can carry out Step 4 in General Electric's *Productive* Maintenance plan. To begin with, assume the worst: an armature failure which would require lengthy downtime, at $700 per hour. The motor involved is a 500-hp slow speed d-c motor on a machine critical to production. When all figures are added, it is evident that stocking of a complete armature is the most economical protection for this specific motor. Your G-E representative can help you make the right decision about better protection for each of your critical drives.

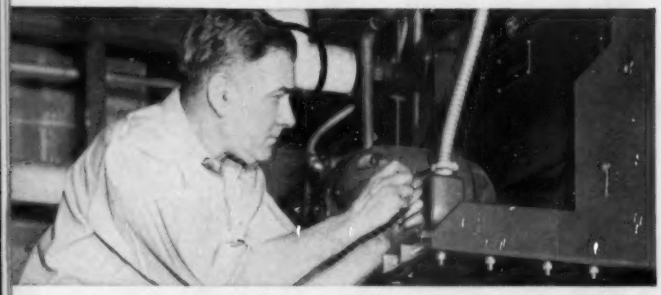
THIS EXAMPLE SHOWS YOU HOW...

Productive Maintenance

The problem of keeping your key electrical equipment in operation isn't a simple one these days when the equipment and the production lines are becoming more and more complex. To solve the problem, you must bring to bear more maintenance know-how and specialized skills than ever before. More and more, the responsibility for increasing production—through more effective maintenance—rests on your shoulders.

This *Productive Maintenance* 5-step plan can make your maintenance budget more effective...

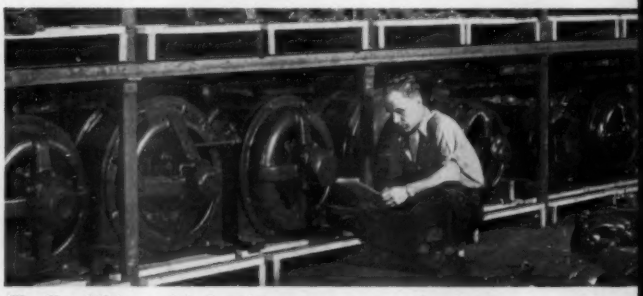
1. Gather complete equipment data. A record system of this inventory is a basic part of your program.



2. Determine amount of routine maintenance necessary for your system. Your G-E representative will help.

3. Put your record system to work. Set up inspection cycles, work orders and systematized stocks.

4. Inspect and evaluate all equipment vital to production. This data will help you determine the parts protection needed for each key item of electrical equipment.



5. Establish a critical maintenance program by stocking parts on a planned basis and scheduling overhauls well ahead of the actual maintenance date.

CUTS TOTAL COST OF BREAKDOWNS

General Electric's five-step *Productive* Maintenance plan can help you meet this responsibility. This plan is essentially an application of men, materials, and tools. (See 5 steps at top of page) By organizing this idea into simple steps, you can get more effective maintenance, more production from each machine and a smoother work flow.

Your General Electric Service Shop or renewal parts representative can give you the complete *Productive* Maintenance story. Ask him to arrange a showing of the G-E sound-color film on *Productive* Maintenance and to give you specific help and suggestions in setting up your own program. Or, fill in the convenient coupon on the next page and ask for General Electric brochure, "5 Steps to *Productive* Maintenance."

GENERAL ELECTRIC

TURN PAGE FOR PRACTICAL HELP

Call in a G-E representative for help in starting your own *Productive Maintenance* program

TRAINED ASSISTANCE in planning overhaul schedules (step 5) is yours for the asking. Your G-E Service Shop representative is a specialist who will work with you in setting up each step in a *Productive* Maintenance program specifically designed for your own plant.

COMPLETE PARTS DATA is essential. G-E Renewal Parts specialists can help you tailor a renewal parts program for your plant, and also guide you in establishing your parts inventory system (steps 4 and 5). Take advantage of this expert help.

Plan your overhauls this way: Systematically remove from operation the equipment that needs overhauling most. Do this at the most favorable time from your production standpoint. These planned, short-term outages take far less time and expense than unplanned shutdowns. Your G-E Service Shop representative can help assess your equipment's condition, and utilize G-E Service Shop facilities to make your *Productive* Maintenance program fully effective.

When setting up your *Productive* Maintenance program, steps 4 and 5 are most important. It will pay you to ask G-E maintenance experts for guidance in organizing your renewal parts budget so every dollar gives the most protection possible. This will help your maintenance become productive faster. Most parts are carried by a nation-wide network of strategically located G-E warehouses, as well as distributors in your area.

Productive Maintenance — as vital as production itself!

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY
APPARATUS SALES DIVISION, SECTION 801-16
SCHENECTADY 5, NEW YORK

- ☐ Please send me the detailed manual "5 Steps to *Productive* Maintenance" (GEA-6087).
- ☐ Please have a G-E representative call on me.
- ☐ I'd like to arrange a showing of the 25-minute sound-color movie, "*Productive* Maintenance."

NAME_____ POSITION_____

COMPANY_____

CITY_____ STATE_____

It's Lyon by a landslide in a recent preference survey among executives in companies throughout the country. They gave Lyon five times more first choice mentions than the second highest manufacturer . . . and twice as many as the next twelve combined!

A nationally known research company compiled those figures by asking key men in 5,000 companies this question:

"If your company were in the market for steel equipment such as steel shelving, lockers, work benches, shop boxes, etc., what manufacturers would you consider?"

Your nearest Lyon Dealer offers the world's most diversified and most preferred line of quality steel equipment. (A few items are shown below.) Equally important, he can show you how to get the most out of steel equipment in terms of time, space and money.

LYON METAL PRODUCTS, INC.
General Offices: 1091 Monroe Ave., Aurora, Ill.
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Lyon also has complete facilities for manufacturing special items to your specifications.

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• Stools	• Storage Cabinets	• Tool Boxes	• Toolroom Equipment	• Filing Cabinets	• Work Benches	• Drawer Units	• Tool Trays
• Bin Units	• Drawing Tables	• Parts Cases	• Wood Working Benches	• Hanging Cabinets	• Bench Drawers	• Hopper Bins	• Shop Desks

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Vibration

REDUCED TO THE VANISHING POINT

REDUCED TO THE VANISHING POINT

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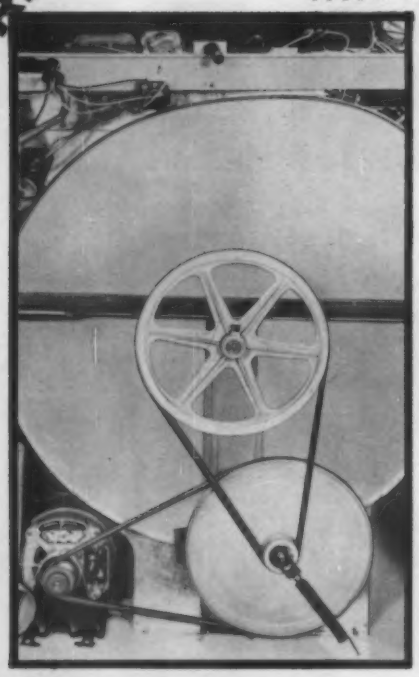

in the electronically-made

U. S. VIBRA-LESS V-Belt

The new U. S. VIBRA-LESS Belt brings new efficiency to washing machines, driers, belt-driven fans, air conditioners, machine tools, grinders and a host of other applications. *Electronic tension* and a *new molding method* are the reasons why.

Electronic Tension process builds the pulling cords into the belt by error-proof electronics, instead of by mechanical means. All cords are placed and spaced with scientific accuracy—to guarantee that each pulls its full share of the load, thereby prolonging belt life. Each cord is of equal tightness, for exact uniformity and greater reliability.

And along with Electronic Tension, "U. S." has introduced a *new method of molding* which produces a smooth surface with no high spots or imperfections. Consider what this means to high-precision machinery.

The new U. S. VIBRA-LESS Belt is so superbly accurate and uniform in construction that it runs with a smoothness and a silence never before encountered on a V-Belt drive. It reduces wear and tear on pulleys and bearings, prolonging belt life and drive life, and the equipment on which it is used. *Vibration is imperceptible,* thanks to the unfailing accuracy of these new developments.

U. S. VIBRA-LESS Belts are obtainable through any of the 27 "U.S." District Sales Offices or any of the selected "U.S." distributors.

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CONSTRUCTION BRIEFS — a review of fundamentals for the plant engineer

Prepared by R. J. Bonthron, Mechanical Engineer

COLUMNS

CONTINUING THE COVERAGE of columns, it has been thought advisable to "recap" some of the formulas and calculations from the past two Briefs, and at the same time, present some background formula theory. Although it has been pointed out that the straight line formula is most practical for general industrial applications, its derivation may be of interest.

To avoid further confusion in terms, an italic letter l (l) has been adopted to indicate length.

Each of the many different empirical formulas for computing the load carrying capacity of columns expresses in a simplified form an approximation to the theoretical solution and to experimental data. Initial variations from a perfectly straight column have considerable effect on the load a column can safely carry. Since these initial variations are difficult to predict, a sizable factor of safety is included in the empirical equations. To better understand these equations and when they apply, a look at the theoretical solution is in order.

According to column theory a perfectly straight column with hinged supports at each end will suddenly buckle when the compressive load reaches the critical value:

$$Pcr = \frac{\pi^2 EI}{l^2}$$

where E is Young's modulus, I is the minimum moment of inertia of the cross-sectional area, and l is the length between supports. This can be expressed in another form by dividing through by the area.

$$\frac{Pcr}{A} = Scr = \frac{\pi^2 E}{l^2}\left(\frac{I}{A}\right)$$

Thus an equation for the critical stress is obtained. Previous articles have explained the equation $I/A = r^2$, where r is called the radius of gyration. The equation for critical stress can be expressed as follows:

$$Scr = \frac{\pi^2 E}{\left(\frac{l}{r}\right)^2}$$

The term $\frac{l}{r}$ is called the slenderness ratio. This equation indicates that as l/r becomes small, the critical stress becomes extremely large as shown by the extended dotted line in Fig. 1. For a short column where l/r is small failure is due to exceeding the allowable compressive stress of the material and not due to buckling.

Figure 1 shows the safe values of P/A for different l/r ratios, in the case of the perfect column. If the column is initially a little out of line or if the load is not applied exactly through the centroid of the cross section, the values will not follow the perfect curve, but will form a band of values, as shown in Fig. 2. The existence of the band represents the variation of test results from the true curve. From this band, empirical formulas can be derived, and Fig. 2 illustrates the origin of the straight line formula. Two other important empirical formulas are the Rankine and the parabolic formulas.

Following examples show range and application of these formulas.

Parabolic — AISC; l/r 0 to 120

$$f = 17000 - 0.485\left(\frac{l}{r}\right)^2$$

Rankine — AISC; l/r 121 to 200

$$f = 1 + \frac{18000}{\frac{1}{18000}\left(\frac{l}{r}\right)^2}$$

Straight line—Chicago Building Code—l/r 30 to 120

$$f = 16000 - 70\,\frac{l}{r}$$

All of the preceding cases are based on the assumption that the ends of the columns are hinged. Consideration must be given to other types of end supports such as a free end and a fixed end. For these answers one must look again at the theoretical solutions for the perfectly straight column. The critical buckling loads for the three columns shown in Fig. 3 are as follows:

Hinged ends: $P = \frac{\pi^2 EI}{l^2}$

Free end: $P = \frac{\pi^2 EI}{4l^2}$

Fixed ends: $P = \frac{4\pi^2 EI}{l^2}$

This means that a column with one end fixed and one end free can safely carry as much load as a hinged end column twice as long. A column with both ends fixed can safely carry as much load as a hinged end column half as long. These facts are used in applying the empirical formulas to columns with other than hinged ends. If the column has one free end and one end fixed, replace the term l in the equations by twice the length of the column. If the column has fixed ends, replace the length l by one-half the length.

Example 1.

A column with one end free and one end fixed is 10 ft long and must carry a load of 75,000 lb. Choose the smallest wide flange I-beam suitable.

Solution:

This is equivalent to a 20-ft hinged column.

$$\frac{l}{r} = \frac{20 \times 12}{r} = \frac{240}{r}$$

Try 8WF24. $r = 1.61$ $A = 7.06$

$$\frac{l}{r} = 149$$

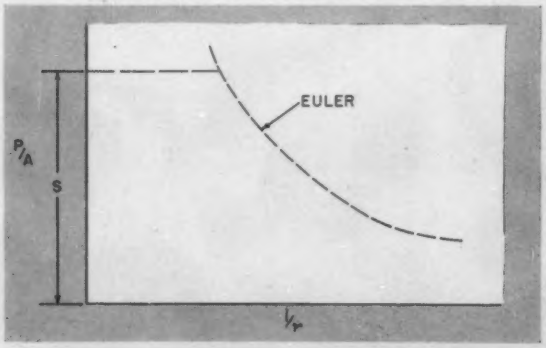


Fig 1. Plot of P/A versus l/r illustrates formula derivation

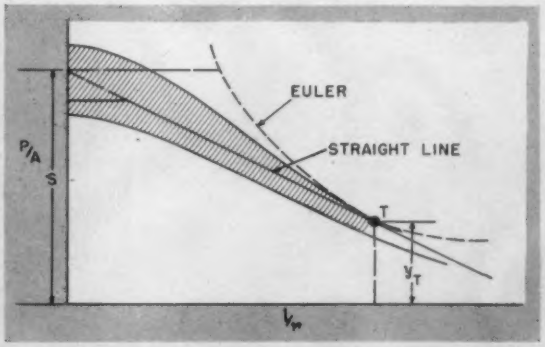


Fig. 2. Test values plotted as in Fig. 1 show variations

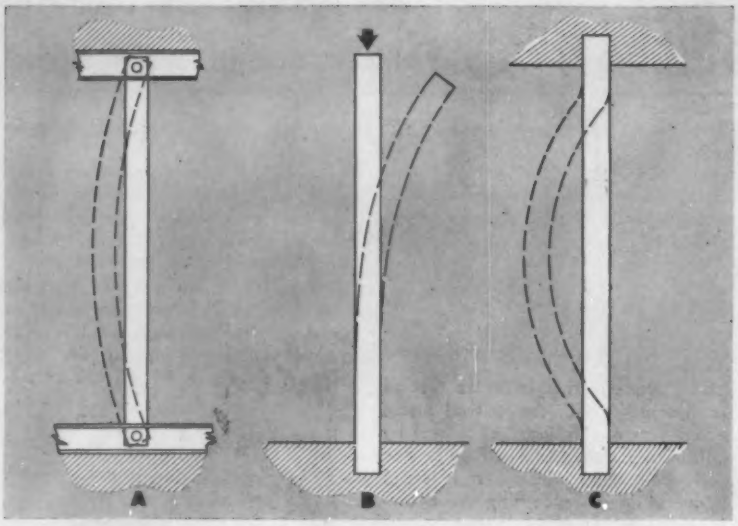


Fig. 3. Types of column supports. Dashed lines exaggerate bending under load

Allowable stress $f = \dfrac{18000}{1 + \dfrac{(149)^2}{18000}}$

$= 8070$ psi

Allowable load =
A = 7.06(8070) = 57,000 lb.
Column will not carry 75,000 lb.
Try 8WF31. r = 2.01 A = 9.12

$\dfrac{l}{r} = 120$, $f = \dfrac{18000}{1 + \dfrac{(119.5)^2}{18000}}$

$= 10{,}000$ psi

Allowable load = 91,200 lb
This column will be adequate.

Example 2.

A column with both ends fixed is 20 ft long. If a 6WF18 section is used, what is the maximum load that can be carried? This is equivalent to a hinged end column 10 ft long.

$A = 5.31 \quad r = 1.48 \quad \dfrac{l}{r} = \dfrac{120}{1.48} = 81$

Sw = 17,000 — 0.485 $(81)^2$ = 13,800 psi

Allowable load = 13,800 (5.31) = 73,300 lb

In the preceding examples the minimum radius of gyration, corresponding to the minimum moment of inertia, was used. A column, if it buckles, will buckle in the shape that corresponds to the smallest critical load. Generally this means that the column buckles in such a manner as to bend about the axis of minimum moment of inertia. For every cross section there will exist two perpendicular axes thru the center of gravity about which the moments of inertia will be maximum and minimum. If the maximum and minimum are the same value, as in a circle or a square, then the moments of inertia about any axis thru the center of gravity has the same value. If the section has an axis of symmetry, that axis is either the maximum or the minimum. If the section has two and only two axes of symmetry, one is the axis of maximum moment of inertia, the other is the axis of minimum moment of inertia, and these two axes must be perpendicular. Try drawing an area with just two axes of symmetry that are not perpendicular.

Example 3.

A 3½ x 2½ angle is to be used to support 11,000 lb. If the angle section is 9 ft long and hinged at both ends, how thick must the section be? For thicknesses from ¼ in. to 7/16 in., r = 0.54.

$l/r = \dfrac{9(12)}{.54}$, $f = \dfrac{18000}{1 + \dfrac{40000}{18000}}$

$= 5600$ psi

Try 5/16 in. thick. A = 1.78
Allowable load = 5600 (1.78) = 9,980 lb

Try 3/8 in. thick. A = 2.11

Allowable load = 5600 (2.11) = 11,800 lb

This section will be satisfactory.

To determine the load that a column can safely carry one must know the shape in which the column will buckle. This requires that one consider any supports that may be acting in addition to the end supports. As an example, suppose that a 12 ft channel section is hinged at both ends and braced at the center as shown in Fig. 4.

Example 4.

A 5 x 1¾ — 11.5 lbs per ft channel, 12 ft long, is supported as shown in Fig. 4. Find the safe load.

If the channel buckles as in 4(a), bending takes place about the x-x axis. For this axis r = 1.76 in., l = 12 ft, A = 3.36

$\dfrac{l}{r} = \dfrac{144}{1.76} = 81.8$

f = 17,000 — 0.485 (6700) = 13,760 psi

Allowable load = 13,760 (3.36) = 46,100 lb

If the column buckles as in Fig. 4(b), the channel bends about the y-y axis. For this case r = 0.49 in., l = 6 ft, A = 3.36

$\dfrac{l}{r} = \dfrac{72}{.49} = 147$

$f = \dfrac{18000}{1 + \dfrac{(147)^2}{18000}} = 8180$ psi

Allowable load = 8180 (3.36) = 27,400 lb

The maximum load this channel can safely carry is 27,400 lb.

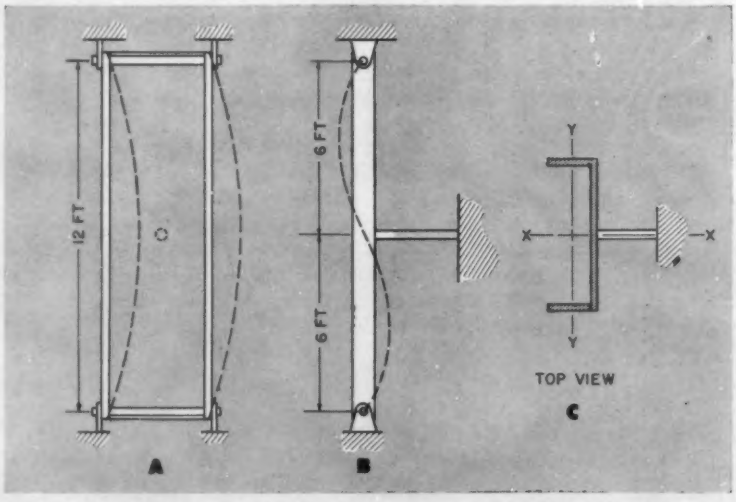
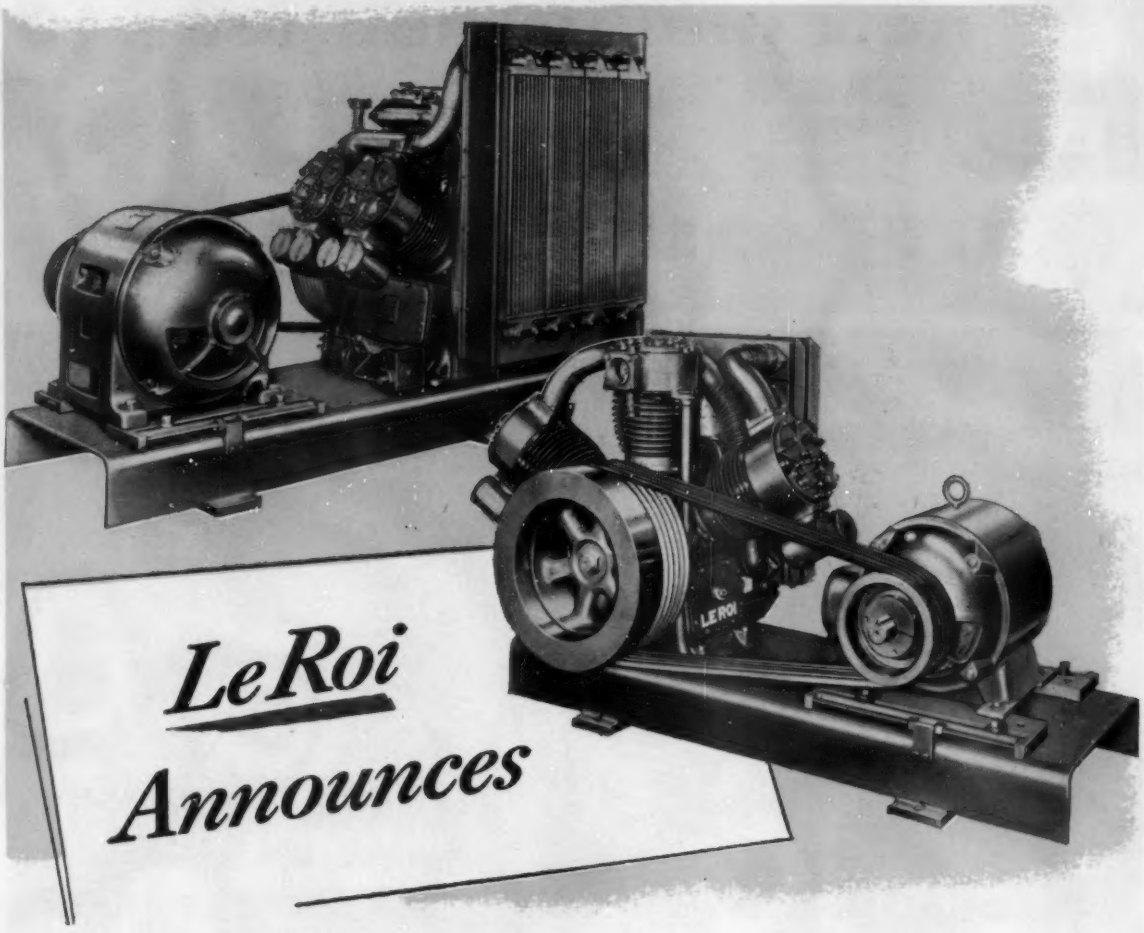


Fig. 4. Braced channel column, with both ends hinged may bend along two axes



LeRoi Announces

Three New Stationary Compressors

Two-stage air-cooled units in 50, 75, and 100 hp. sizes having 200, 330, and 440 cfm capacities at 125 lbs. pressure

Now, Westinghouse Air Brake Co., through its Le Roi Division, adds three new compressors to its stationary line, giving you a size range from ½ to 100 hp. Built to give you years of service, these new compressors are designed to provide you with many important benefits—benefits that mean low-cost air for your plant, mine, quarry, ship, or construction job.

Low-cost operation — Good mechanical and compression efficiency resulting from 2-stage compression and intercooling keeps power costs to a minimum. Moreover, since these new Le Roi's are air-cooled, cooling-water cost is eliminated and attention on the part of the operator is greatly reduced.

Low-cost installation — Compact size reduces headroom and floor space requirements. Again, air cooling eliminates the need for water and water piping so that you can install these units practically anywhere with no fear of freezing. Minimum vibration and light weight lets you bolt them to a substantial floor and save on foundation costs.

Low-cost maintenance — All valves are interchangeable, both intake and discharge. Shrouded-type intercooler and large air passages promote longer valve life. No anti-freeze is required and there are no cylinder jackets or intercooler water passages to clog or scale. Forced-feed lubrication supplies oil under pressure to all moving parts and a sight-level oil gauge keeps the operator posted on the oil supply. The crankshaft is suspended on taper roller bearings that seldom need adjustment, and all parts are easily accessible.

Dual control is standard equipment and permits either constant-speed or automatic start-and-stop regulation. Here's a practical answer to low-cost air supply. Write for our latest literature.

SC-100

LE ROI Division of Westinghouse Air Brake Co.

MILWAUKEE 14, WISCONSIN

Distributors in all principal cities

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Only your imagination limits the applications of this ingenious slotted angle framing material. Users discover that they can build whatever they need—when they need it—and build it cheaper! Easily dismantled, DEXION Slotted Angle can be reused in new ways to meet changing needs. There's no waste! And anyone who can use a wrench and a saw (or DEXION cutter) can build with this precision-made slotted angle.

DEXION Slotted Angle is a packaged product, ten pieces to a package, each piece 10 feet long. There are three types, with dimensions of 3" x 1½" x .080"; 3" x 1½" x .104"; 2¼" x 1½" x .080".

Easy to store. DEXION package occupies approximately 1 cubic foot of space

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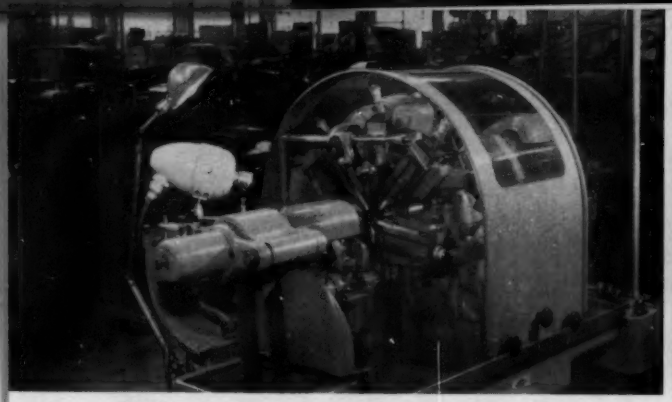
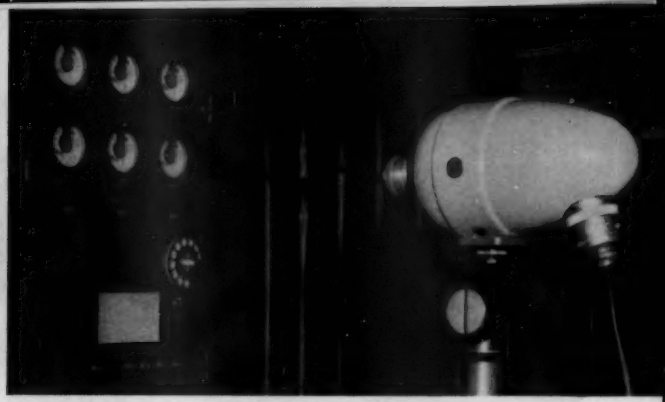


Watching machines is a job for the GPL TV camera. Above, the GPL camera mounted to face a screw-making machine instantly reports anything needing attention to the operator, increasing the number of machines he can tend efficiently.



In automation, whenever there are dials to be checked, the GPL TV camera can report to a central point. Motorized on rails or to swing around, the camera scans a whole bank of dials, sweeps an area. Equally useful in non-automatized production.

Danger is no problem. The GPL industrial TV camera can look into the face of danger and never blink. Above it reports to the operator a hazardous process taking place inside a test cell.

Wherever security control is a problem, strategically placed GPL TV cameras multiply the eyes of your guards. Here a single camera keeps watch over vital military equipment. Similarly, GPL TV cameras can guard the aisles of warehouses, restricted areas, exposed loading platforms.

Control Problems Solved by Seeing

GPL industrial television opens up new possibilities in control by providing instantaneous visual information on what's happening.

Good control is based on good information. And for many purposes no information can match seeing what is happening right on the spot. You can do just this, anywhere, anytime, with the industrial and institutional television equipment designed and made by General Precision Laboratory Incorporated, and known as GPL ii-TV.*

No spot is too far away, too dangerous, too cramped for GPL ii-TV. Unattended, the camera permits observers to see around corners, through walls, across thousands of miles, within the whirling heart of a machine. It can bring many scattered events to a single observer and, with GPL TV projectors, a single event to many scattered audiences.

With this new tool you can solve many kinds of control problems. You can use GPL industrial television to monitor remote machines. You can study a wing tip five miles up, or watch a grapnel grope along the ocean floor. You can follow and control a dangerous process, step by step, safe from fumes or radiation. You can control access to restricted areas, check signatures against a master file.

In fact, you can use GPL industrial television for anything that requires instant communication of visual information. You can improve skills and techniques of workers in scattered plants with visual demonstrations. You can run face-to-face conferences of far-flung personnel.

A GPL Industrial and Institutional Television System can do all these things for you—and many others—with high efficiency and low cost. Here's why:

* Trade-mark

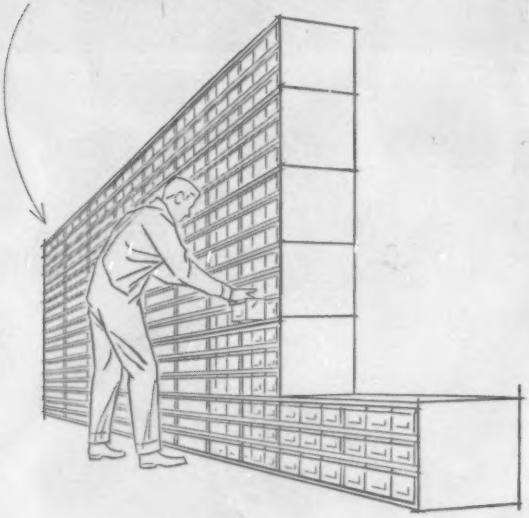
- It is high-sensitivity, quality equipment. Behind it lies the long experience of General Precision Laboratory in building the finest in broadcast television. GPL equipment is used by 90 percent of all studios equipped for video recording; GPL cameras and controls are found in many of the finest broadcast TV installations.
- Military TV equipment must be really rugged—and GPL has been building it for years. Now GPL has designed your industrial TV system with high-strength elements and simple design that stand the gaff. Special housings protect the camera from weather, heat, shock, explosions.
- GPL's compact industrial camera is bullet-shaped to squeeze in almost anywhere. Only 2" larger in diameter than a baseball, it weighs 5 lbs. The 26-lb. control cabinet, the size of an overnight case, can be far from the camera.
- GPL's industrial camera is unique in its ability to obtain a good picture at very low light levels. With its Vidicon pick-up tube it can work under highly adverse conditions.
- GPL enables you to multiply your audience with a TV projection system for industrial use. It is made like the famed GPL theatre projectors used all over the country; mounted on rollers for complete mobility.

For more information on what GPL ii-TV can do for you—and suggestions on your special problems—write to: GENERAL PRECISION LABORATORY INCORPORATED, Pleasantville, N. Y. (A subsidiary of General Precision Equipment Corporation.)

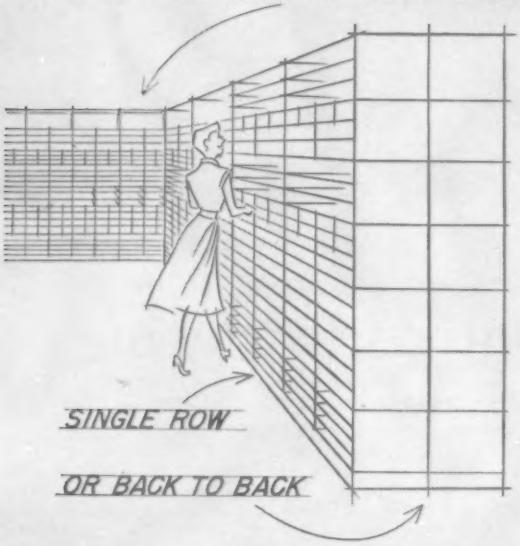
For more facts circle 558 on Reply Card

HOW TO USE HALLOWELL STORAGE WALLS IN MAKING ECONOMICAL STORAGE SPACE

STACK THEM AGAINST WALLS
-AS HIGH AS YOU WANT
-AS LONG AS YOU WANT



USE THEM TO BUILD PARTITIONS OR WALLS



SINGLE ROW

OR BACK TO BACK

SET THEM UP ADJACENT TO MACHINES AND OTHER WORK AREAS TO STORE BOOKS, TOOLS, PARTS, ETC.

Prime Cold Rolled Steel · All Welded and Finished with Baked on Enamel · Interchangeable Drawers · 3 Different Size Drawers Can Be Intermingled in the Same Case · Stocked by Leading Shop Equipment Dealers · Send for Bulletin 2093 · Hallowell Shop Equipment Division, Standard Pressed Steel Co., Jenkintown 26, Pa.

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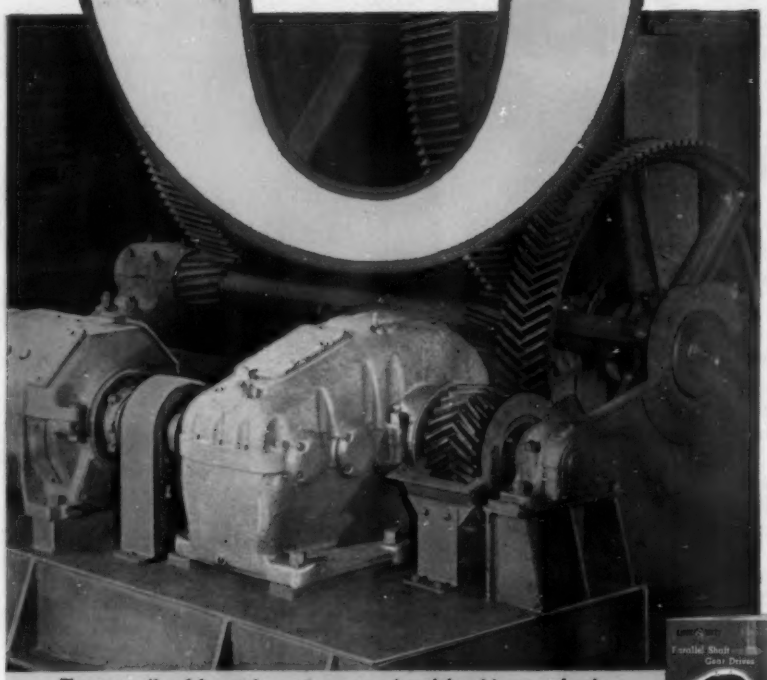
For more facts circle 559 on Reply Card

6 reasons why

Link-Belt Parallel Shaft Gear Drives

ASSURE CONTINUOUS PRODUCTION



Ten-ton coils of hot strip steel are transferred by this up-ender in a modern mill. Link-Belt parallel shaft gear drive fitted with outboard bearing on output shaft withstands the exceptionally tough duty.

LINK-BELT'S compact, self-contained parallel shaft gear drives are designed to avoid common problems encountered in transmitting heavy shock loads. Here's how:

1. FOR DEPENDABLE OPERATION gears are precision-machined, shafts rigidly supported.
2. TO WITHSTAND HEAVY SHOCK and overhung loads, ball and roller bearings are used throughout.
3. TO PREVENT ENTRANCE OF DIRT and moisture, effective grease-lubricated seals are used on all shafts.
4. FOR SUPPLYING OIL to each rotating part at all speeds, automatic splash lubrication is used.
5. TO PREVENT REVERSE ROTATION on conveyors, elevators and similar equipment, a built-in backstop can be provided.
6. FOR EASY INSPECTION OR MAINTENANCE, all parts can be removed without disturbing base, which can be grouted in concrete.

Book 2619 gives complete details. Get a copy from your Link-Belt office or authorized stock carrying distributor. Or write direct.

Get JOB-MATED drive combinations from the complete Link-Belt line

In addition to parallel shaft gear drives, Link-Belt builds in-line helical and worm gear drives, Gearmotors, Motogears, variable speed drives, fluid drives, chains, sprockets, couplings, bearings, etc. All are pre-engineered for easy installation and maximum efficiency.

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LINK-BELT COMPANY: Executive Offices, 307 N. Michigan Ave., Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World. 18,074

For more facts circle 560 on Reply Card

Wagner®
ELECTRIC MOTORS
...the choice of leaders in industry

New NEMA Frames
Standard and Explosion-proof

Type EP
215 Frame

Wagner Totally-Enclosed Fan-Cooled Motors

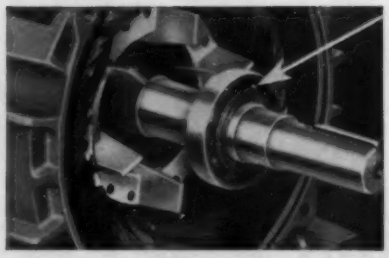
cut maintenance time and costs

Check the features of the new *Wagner Type EP Totally Enclosed Motor*. They spell the difference between needless expenditures in maintenance time and costs . . . and a definite savings in motor upkeep and repairs. You'll find that for general industrial use where dust, dirt, filings, abrasives, steel chips or moisture are present, the Wagner Type EP Motor gives steady, troublefree performance and longer service life.

Wagner Type JP Explosion-Proof Motor . . . has the same quality construction as the Type EP — plus added features which make it completely safe to operate where explosive dust, gases or vapors are present.

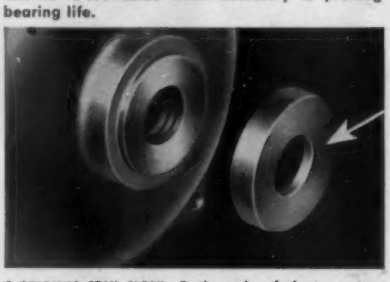
Both Type EP and JP Wagner motors are available in ratings up to 250 horsepower. For complete information, just call the nearest of our 32 branch offices, or write for Bulletin MU-203.

Wagner Electric Corporation
6492 Plymouth Ave., St. Louis 14, Mo.

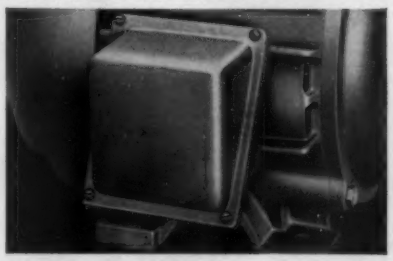


1 HEAVY-DUTY BALL BEARINGS—Highest quality bearings of more than ample capacity provide long, troublefree service.

2 BEARINGS CAN BE RE-LUBRICATED—Wagner motors can be re-lubricated when necessary to prolong bearing life.



3 BEARINGS STAY CLEAN—Both ends of these motors are equipped with running shaft seals, a machined collar mounted on the motor shaft.



4 EASY TO CONNECT—Large diagonally-split conduit box provides ample room for making connections. Leads are permanently identified.

5 NO GREASE LOSS—Bearing housings have effective seals to prevent escape of grease.

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M55-16

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American Blower
Ventura Fans
offer you

top performance and economical ventilation

American Blower Model K Ventura Fan

You can count on American Blower Ventura Fans to do the job they are designed for, with high efficiency and a minimum of maintenance. They are built for long life and top performance. All ratings are certified.

American Blower Model K Ventura Fans are ruggedly constructed, heavy-duty propeller fans for tough industrial applications. They offer the power you need . . . when you need it, and will operate against static pressures up to 5/8". Request Bulletin 6514.

American Blower Ventura Fans are attractively designed, quality built, and easy to install . . . *yet competitively priced.* Ventura Fans come in a wide range of sizes and capacities — with constant-speed and two-speed direct drives, totally enclosed motors — to satisfy your exact requirements.

CERTIFIED RATINGS

Certified ratings are the result of tests made by the Manufacturer in accordance with the Standard Test Code for Centrifugal, Axial, and Propeller Fans adopted jointly by the National Association of Fan Manufacturers, Inc. and the American Society of Heating, and Ventilating Engineers.

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Certified Ratings

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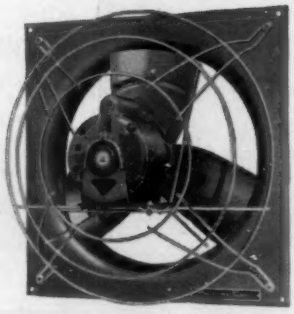

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Model G, at left, is a sturdily built and attractive fan suitable for light industrial duty and commercial applications. It is especially quiet-operating, making it ideal for offices, stores, and lobbies — or wherever quiet operation is required. Write for your copy of Bulletin 6414, which gives complete performance data.

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AMERICAN BLOWER

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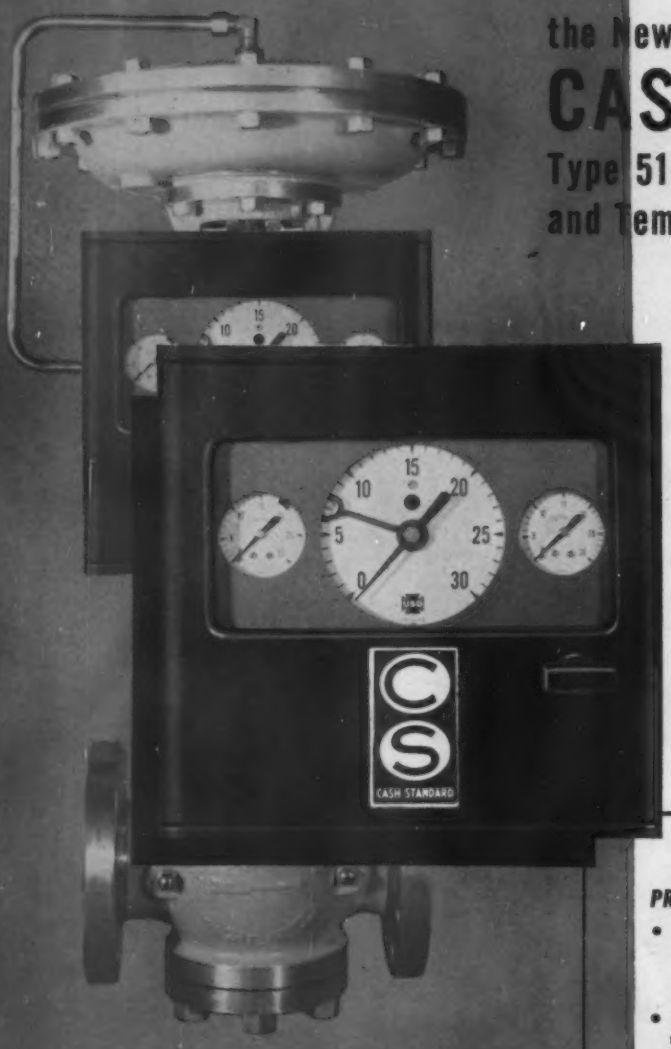

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Type 51 Pressure Pilot and Temperature Pilot

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- Pressure-sensing elements available in phospor bronze, beryllium copper or stainless steel

  Pressure ranges: 0-15 to 0-10,000 psi also 0-30" H_2O and 0-30" Hg vacuum

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Pressure, Hydraulic, Temperature, Process and Combustion Controls

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Maintenance standards, and their introduction and use, always generate questions . . . Here are some of the answers to queries such as "How much do they cost?" . . . "Can we use them profitably?" . . . "Can a small plant employ these standards?" . . . "How do they work?" . . . written by a man who has spent many years working on the solutions to such problems.

Simplified Maintenance Standards—

Applying Them Profitably in Small Plants or Big Plants

By **ROBERT S. SMITH, A. T. Kearney & Co., Management Consultants, Chicago, Ill.**

INEXPENSIVE, SIMPLIFIED, predetermined time standards can be made available to the plant engineer for use in controlling labor costs in the maintenance trades. With three to four weeks of training, local personnel can administer this perpetual control plan which provides data for measuring labor performance, for establishing preventive maintenance programs, for accurate estimates of costs and savings in connection with improvements, repair and alteration jobs, and for comparison with estimates submitted by outside contractors.

Let's see how it works in one department, the pipe shop, of any company. Simplified Maintenance Standards have been in effect in this department for about six months and the program is pretty well established. Jack Thompson, the production checker, is responsible for the application of standards to the 30 pipe fitters and helpers who work out of the pipe shop. Jack is a young fellow with about two years' practical experience in the pipe shop who was chosen for this job because the plant engineer and pipe shop foreman felt that he was good supervisory material. In their opinion a couple of years as a production checker would give him the kind of management training he would need to become a better-than-average supervisor. Jack likes the idea, too, because it has given him a point of view and training that he would never have experienced had he not had this opportunity.

Let us consider Jack's duties as he approaches his desk in the standards office the first thing in the morning. He is about to start out on his first trip of the day. This is the middle of the week, Wednesday morning. In his loose leaf binder Jack has a production report for each job assignment on which the men were working the previous afternoon. His first task is to go to the pipe shop and check over the dispatch board to see if there have been any new assignments given out this morning. Jack and the pipe foreman work pretty close together so that he is able to anticipate future assignments and this is only a quick check to see if there have been any changes since his last check with the foreman.

Next step is to prepare a route schedule which will allow him to cover the ground with the least amount of walking. Actually, all that is required is to make whatever changes are needed in the previous day's schedule to allow for new assignments that might be starting this morning.

Production Report

By this time, Jack is pretty familiar with the type of work, the individuals and the jobs currently in process. Some jobs he will need to visit only once during the day, some two or three

Fig. 1. This is a maintenance production report. It gives all the pertinent information necessary on the piping job used as an example in this article

CHICAGO Plant — A. T. KEARNEY & CO. — Job No. 12-25 6741-10 Work Order No.

PIPE SHOP Department — INDUSTRIAL ENGINEERING DEPT. — BLDG. 3-2ND FL. Location

MAINTENANCE PRODUCTION REPORT

Job Description: RUN 3" LINE FROM NO. 1 PUMP TO NO. 3 TANK	No. of Units	N.M. Per Unit	Std. Data N.M.	Clock No.	Date	Act. Hrs.	Std. Hrs.
					3/21	7.0	7.5
CUT 3" - M/C	7	2.0	14.0	501 PF M/C			
THREAD 3" - M/C	29	3.6	104.4				
I. 3° FL - M/C	12	5.4	64.8				
I. 3" FJA	4	6.6	26.4				
B	8	9.6	76.8				
I. 3" SJA	2	3.9	7.8		3/21	7.0	7.5
B	6	7.4	26.4	504 H			
C	5	10.1	50.5				
					Total	14.0	15.0

Auxiliary Class	Standard Data Normal Minutes	371.1	Performance Index	107%
	Auxiliary Normal Minutes	390.0		
GENERAL	Total Normal Minutes	761.1	Checked by	JT
	Conversion Factor (1.25/60)	.021	Extended by	MH
	Standard Hours Produced	15.0	Approved by	GM

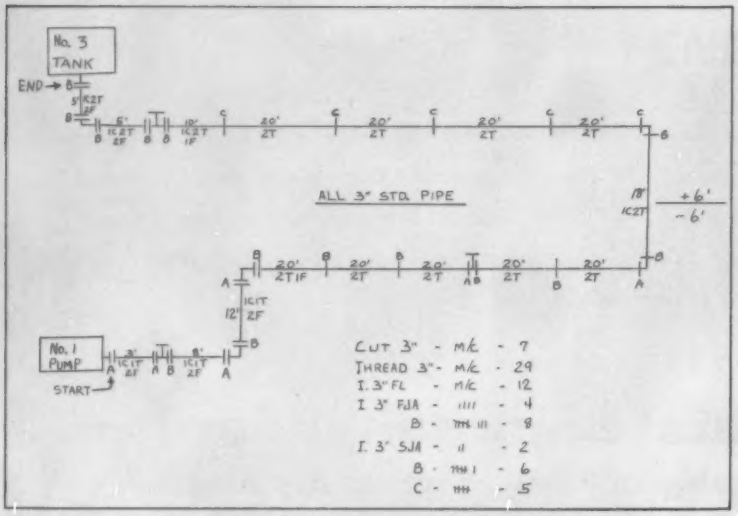


Fig. 2. This is the other side of the production report shown in Fig. 1. This sketch shows the physical dimensions and actual operations in our "typical job"

times and some, of a semi-repetitive or repetitive nature, not at all.

Right now, he is about to make out a production report for the job in which we are interesfed. This is a non-repetitive type of job which will serve as a good example of how simplified maintenance standards work.

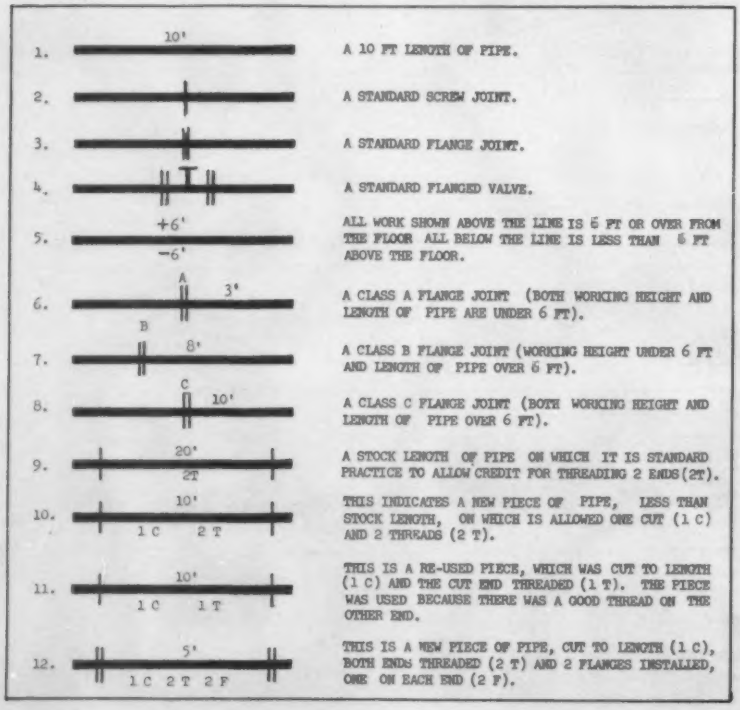
Refer to Fig. 1, a maintenance production report. This is a standard form to be used throughout the several plants of the company and in all maintenance departments where standards are in use. The locations of the plant (Chicago) and of the department (Pipe Shop) have previously been rubber stamped on a supply of these forms which were prepared for Jack by the standards clerk. His first entry is the Job. No. (12-25). This is a standards department method of coding individual job assignments, since one work order may be broken up into a number of individual Job assignments. The number 12-25 means that this is the 25th job assignment for the 12th week of the year.

Individual production reports are filed and referred to by this code number. This particular work order is No. 6741-10. It is necessary for this number to be on the production report so that costs can be accumulated and analyzed, not only for the work done by the pipe shop but by other departments as well.

From the copy of the shop order (which he found on the dispatch board under the clock number of the pipefitter to whom the job was assigned), Jack gets not only the work order number, but the location (Bldg 3—2nd fl), and a description of the job (Run 3-in. line from No. 1 pump to No. 3 tank.

He next enters on the production report the clock number and job classification of the men to whom the job is assigned (501—PF—1/c and 504-H). In this case, it is a first-class pipefitter and a helper. In the date column he enters the date (3/21) in each man's time section. He is now ready to visit the job on the second floor of building 3.

Fig. 3. This is an explanation of the symbols used in the job shown in Fig. 2


1. 10'
A 10 FT LENGTH OF PIPE.
2. A STANDARD SCREW JOINT.
3. A STANDARD FLANGE JOINT.
4. A STANDARD FLANGED VALVE.
5. +6' -6'
ALL WORK SHOWN ABOVE THE LINE IS 6 FT OR OVER FROM THE FLOOR ALL BELOW THE LINE IS LESS THAN 6 FT ABOVE THE FLOOR.
6. A 3' B
A CLASS A FLANGE JOINT (BOTH WORKING HEIGHT AND LENGTH OF PIPE ARE UNDER 6 FT).
7. 8'
A CLASS B FLANGE JOINT (WORKING HEIGHT UNDER 6 FT AND LENGTH OF PIPE OVER 6 FT).
8. C 10'
A CLASS C FLANGE JOINT (BOTH WORKING HEIGHT AND LENGTH OF PIPE OVER 6 FT).
9. 20' 2T
A STOCK LENGTH OF PIPE ON WHICH IT IS STANDARD PRACTICE TO ALLOW CREDIT FOR THREADING 2 ENDS (2T).
10. 10' 1 C 2 T
THIS INDICATES A NEW PIECE OF PIPE, LESS THAN STOCK LENGTH, ON WHICH IS ALLOWED ONE CUT (1 C) AND 2 THREADS (2 T).
11. 10' 1 C 1 T
THIS IS A RE-USED PIECE, WHICH WAS CUT TO LENGTH (1 C) AND THE CUT END THREADED (1 T). THE PIECE WAS USED BECAUSE THERE WAS A GOOD THREAD ON THE OTHER END.
12. 5' 1 C 2 T 2 F
THIS IS A NEW PIECE OF PIPE, CUT TO LENGTH (1 C), BOTH ENDS THREADED (2 T) AND 2 FLANGES INSTALLED, ONE ON EACH END (2 F).

Estimating the Job

When he arrives at the site of the job, Jack will locate No. 1 pump and No. 3 tank, and get a general idea of the size and scope of the job and the probable length of time it might take. This is to aid him in determining how often and when he needs to revisit the job. This appears to be a typical maintenance job without any special problems and he estimates, from his previous experience and knowledge of this particular pipe fitter's performance, that the job will take the better part of the day and it will not be necessary for him to see it again until after it is completed.

We find that Jack has next returned to this job late in the afternoon. The job has been completed and the men are just finishing the clean-up and are about ready to return to the pipe shop for their next assignment. Refer now to Fig. 2. This is the reverse side of the production report (Fig. 1), which has previously been prepared for this job. On this sheet, Jack has made a simple line sketch (not a working drawing) using a few standard symbols to indicate the necessary information. The symbols you see are explained in Fig. 3.

All of the operations are presumed to have been done by machine unless circumstances require them to be done by hand.

On the sketch, Jack has indicated all of the necessary information by using the symbols shown in Fig. 3. Refer again to Fig. 1, which is the

front of the production report. Since this job is a typical maintenance pipe fitting job, requiring work to be done both in the field and in the shop, Jack classifies it as general pipefitting and under the heading "Auxiliary Class" he enters "General". In the space opposite "Checked by" he enters his initials (JT). As far as Jack is concerned he is finished with the job for the present and when he returned to the standards office he removed the production report from his loose leaf binder and gave it to the standards clerk. We will consider Jack's duties later. Let us see now what the clerk does to job 12-25 using Jack's report.

Recording the Units

Now, refer to Fig. 2, once more. This is the back of the production report on which Jack made his line sketch. We now see that the clerk has made some additional entries. What she has done is to go over the line sketch and count and tally the number of cuts, threads, flanges installed and joints of each type.

Now we go to the front of the production report, Fig. 1, and see how she has completed her work. She transfers from the back to the front the various operations performed and the number of units of each (Example: Cut 3 in. - M/C. 7 Units). The symbol M/C is used to designate a machine operation.

The next step is to enter the "normal minutes per unit" and for this information she turns to her book of simplified maintenance standards. We will determine for example where she gets the standard times for the last 3 items on the production report, I. 3-in. SJA, B and C. Figure 4 is a reproduction of the standard data for installing standard screw joints, where you will find the following data:

3 in. Pipe, Class A — 3.9 Normal Minutes Per Joint; B—4.4 Normal Minutes Per Joint; C—10.1 Normal Minutes Per Joint.

These are the unit times that appear in the column headed "N.M. Per Unit" on Fig. 1. The other unit times were also taken from their respective standard data sheets and entered on the production report. The next step was to multiply the number of units by the Normal Minutes Per Unit to determine the Standard Data Normal Minutes (7 x 2.0 = 14.0). The Clerk will next total the Standard Data Normal Minutes and enter the total in the proper space at the bottom of the sheet (371.1).

She will turn then to her book of simplified maintenance standards and find Operation No. 1-2, General Auxiliary Credit, Fig. 5. Entering the left-hand column, headed "Standard Data," opposite 364-375, which includes 371.1, she finds 390 as the corresponding number of auxiliary normal minutes to be allowed. Figure 6 is a reproduction of operation 1-1, "Definition of Auxiliary Work." Return now to our production report, Fig. 1.

The Clerk has entered the 390.0 auxiliary normal minutes under the 371.1 standard data normal minutes, added the two together and entered the total normal minutes, 761.1. By multiplying this total by 0.021, we accomplish several things in one step. Total allowances including personal time, fatigue and unavoidable delays, amounting to a total, in this case, of 25 per cent of the total normal minutes, are added and the resulting total divided by 60 to convert minutes to hours. This operation gives a total of 15.0 standard hours produced. The production report is now completed as far as we can go until the time cards for the day are received. These will be available the following morning.

Each production checker enters each day, on the production reports for all jobs in process, as well as for completed jobs, the time charges for the previous day. In our particular example, Fig. 1, the pipefitter and his helper each spent 7.0 hours on the job. Any completed jobs, such as this one, are then returned by the production checker to the standards clerk.

When the clerk receives the production report with the actual hours on it, she pro-rates the standard hours produced (15.0), between the two men in proportion to the hours each worked on the job. Since each worked the same number of hours (7.0), they each get half of the standard hours produced (7.5). She then totals the standard hours produced (15.0), and the actual hours (14.0), and divides 15.0 by 14.0 to determine the performance index (107 per cent). This indicates that the pipefitter and his helper beat the standard time allowed by 7 per cent. The Clerk then enters her initials opposite "Extended by" and turns the production report over to the standards supervisor, George Moore, for final approval. George looks it over, sees nothing out of line, initials, and returns it to the clerk.

If George had found something that did not look proper to him, he could have taken the production report to

Fig. 4. Sheet from maintenance standards giving standard data for installing standard screw joints on various types and sizes of piping

MAINTENANCE STANDARD DATA

Department Pipe Fitters

Operation Install standard screw joint Operation No. 7-1

Pipe Size	Normal Minutes Per Joint — Standard Pipe A	Standard Pipe B	Standard Pipe C	XH Pipe A	XH Pipe B	XH Pipe C
1/2"	1.0	1.5	5.2	1.3	1.9	5.2
3/4	1.3	1.8	5.7	1.7	2.2	5.7
1	1.6	2.1	6.2	2.0	2.6	6.2
1-1/4	1.9	2.4	6.7	2.4	2.9	6.7
1-1/2	2.2	2.6	7.2	2.8	3.3	7.2
2	2.8	3.2	8.1	3.5	4.0	8.1
2-1/2	3.4	3.8	9.1	4.2	4.8	9.1
3	3.9	4.4	10.1	4.9	5.5	10.1
3-1/2	4.5	5.0	11.1	5.7	6.2	11.1
4	5.1	5.5	12.0	6.4	6.9	12.0
5	6.3	6.7	14.0	7.8	8.4	14.0
6	7.4	7.9	15.9	9.3	9.8	15.9
8	9.7	10.2	19.8	12.2	12.7	19.8

Note: Class A - Both working height and length of pipe under 6'
Class B - One under 6' and the other 6' or over
Class C - Both 6' or over

Includes:

1. Dope threads
2. Screw up joint with wrenches, wrench and vise, or pipe machine
3. Handle pipe and fittings from floor to working height by hand, rope or chain hoist, handle in and out of vise or pipe machine
4. Support pipe and fittings for installation with wires, blocks, etc.
5. Line up and adjust pipe and fittings
6. Climb up and down ladders, scaffolds and equipment or crawl under machines and equipment
7. Install pipe in hangers
8. Move ladders, scaffolds and chain hoists, handle tools and equipment

MAINTENANCE STANDARD DATA

Department Pipe Fitters

Operation General Auxiliary Credit — Operation No. 1-2

Normal Minutes Per Job		Normal Minutes Per Job		Normal Minutes Per Job	
Standard Data	Auxiliary Work	Standard Data	Auxiliary Work	Standard Data	Auxiliary Work
1- 3	15	91- 94	160	208-212	305
4- 6	20	95- 97	165	213-217	310
7- 9	25	98-101	170	218-222	315
10-12	30	102-105	175	223-228	320
13-15	35	106-108	180	229-234	325
16-18	40	109-112	185	235-241	330
19-21	45	113-115	190	242-248	335
22-24	50	116-119	195	249-256	340
25-27	55	120-123	200	257-265	345
28-30	60	124-127	205	266-275	350
31-33	65	128-131	210	276-286	355
34-36	70	132-135	215	287-300	360
37-39	75	136-139	220	301-313	365
40-42	80	140-143	225	314-325	370
43-45	85	144-147	230	326-338	375
46-48	90	148-151	235	339-350	380
49-51	95	152-155	240	351-363	385
52-54	100	156-159	245	364-375	390
55-57	105	160-163	250	376-388	395
58-60	110	164-167	255	389-400	400
61-63	115	168-171	260	401-413	405
64-66	120	172-175	265	414-425	410
67-69	125	176-179	270	426-438	415
70-73	130	180-183	275	439-450	420
74-76	135	184-188	280	451-463	425
77-80	140	189-192	285	464-475	430
81-83	145	193-197	290	476-488	435
84-87	150	198-202	295	489-500	440
88-90	155	203-207	300		

Note: When Standard Data normal minutes exceed 500, Auxiliary normal minutes are equal to 440 plus 40% of Standard Data normal minutes in excess of 500.

Applies to:
1. All jobs which do not require a Special Auxiliary Credit

Fig. 5. This section from the standards shows General Auxiliary Credit or amount of "extra" time allowed on specific jobs in pipe fitting department

MAINTENANCE STANDARD DATA

Department Pipe Fitters

Operation Definition of Auxiliary Work — Operation No. 1-1

1. Plan

Includes receive assignment, locate job, discuss with Pipe Foreman, take measurements, make sketches, plan work, check with Production Foreman, give and receive instructions, check measurements during installation, adjust and line up work, check and inspect finished job, get O.K. from Production Foreman when required.

2. Obtain material

Includes get material requisition from Foreman, get material from Storeroom or other storage location and deliver to job, get cleaning supplies, emery cloth, wire for temporary hangers, dope for threads, lumber for blocking and bracing pipe, and similar items. Return unused material or supplies as required.

3. Travel

Includes walk between Pipe Shop and job, deliver tools, equipment and materials from Pipe Shop to job and job to Pipe Shop, deliver parts and materials to and from other shops, obtain and return ladders, chain hoists, extension lights, trucks, tools and other equipment.

4. Miscellaneous

Includes other minor items not otherwise accounted for such as open and close valves, sharpen and repair tools, move obstructions, open and close windows, put on and take off outer clothing, test lines and valves, clean up at end of job, miscellaneous walking, make out and ring job cards, and other miscellaneous activities not covered by standard data operations.

Fig. 6. This is a definition of "Auxiliary Work" for the job under discussion

the second floor of Building 3 and rechecked the job from start to finish. It would be possible to do this because all information required for the application of standard times is visible in the finished job. The production report for job. No. 12-25 is now complete; we are ready for the next step.

Up to this point we have been interested in calculating the performance index on each job assignment. However, we are also interested in the performance index of each man in the pipe shop. The most practical period for this is a week. Any jobs in progress at the end of the week are cut off and considered completed as of the end of the last working day of the week. Credit is given for all work done up to that point. On Monday morning a new production report is made out, a new job number assigned, and the job is handled just as any other new assignment.

Calculating Each Man's Work

To calculate individual performances, the clerk uses a maintenance recap sheet, Fig. 7. On this form there is a section for each individual in which is entered his clock number. (501 and 504 for our pipefitter and his helper). You'll note that there are three columns for each man (Job. No., Hrs. on Stds., Std. Hrs. Prod.). From the Production Report, Fig. 1, the clerk has entered on the recap sheet for both 501 and 504, the Job. No. (25), the Hrs. on Stds. (7.0) and the Std. Hrs. Prod. (7.5). This she does for every completed job as soon as the production report is approved.

Sometimes a pipefitter and helper will work together all week, in which case the performance index would be the same for both. More often, however, helpers are assigned to different pipefitters and different jobs, as they are needed, to enable the foreman to make the most effective use of his manpower. Because of this, it is possible for each man in the pipe shop to come up with an individual and different performance index for the week.

When all of the entries for the current week have been made, the work sheet is completed by adding the Hrs. on Stds. and Std. Hrs. Prod. for each man. In the case of pipefitter 501, these add up to 40.0 and 43.6. These totals are transferred to the maintenance standards report, Fig. 8.

Then, the clerk completes the maintenance standards report in the following manner. She first divides the Std. Hrs. Prod. (43.6), by the Hours on Stds. (40.0) and enters the result (109 per cent) in the performance index column for "This Week." This same

procedure is followed for each individual and for the department total. For the department, she also calculates the per cent of total hours on standards.

This is done by dividing total hours on standards (198.0) by total hours worked (200.0) and for this week that figure is 99 per cent. She then copies, from last week's standards report, the performance index and per cent of total hours on standards for purposes of comparison. A copy of the maintenance standards report, after it has been approved by the standards supervisor, George Moore, goes to the pipe shop foreman, plant engineer and the standards engineer.

Once a week, when the previous week's work is ready, the pipe shop foreman drops in at the standards office and he and the standards supervisor go over the production report for each job, discuss ways and means of improving performance, of reducing costs and improving methods. The foreman also stops in a number of times during the week for a quick look at the results on some particular job in which he is interested, and checks regularly with the production checker for estimates on performance and progress on current jobs so that he can take corrective action as soon as possible whenever it may be needed.

Cost of System

This is simplified maintenance standards actually at work. Everyone is interested in how much it costs to apply simplified maintenance standards. The answer is that the cost is small compared to the savings usually to be realized. To administer the standards, during the first year of operation, should cost about 6 per cent of the hourly payroll of the department in which the application is being made. By the end of the first year, sufficient refinements should have been made to reduce the cost to approximately 4 per cent of the hourly payroll. The ratio of standards personnel is one supervisor and one clerk to each four production checkers. Of course, where a group of six is too large, the jobs can be combined in fewer persons using that ratio.

How do we accomplish those refinements which will make it possible to reduce the application cost from 6 per cent to 4 per cent of the hourly payroll? That can be accomplished by the standards supervisor and production checker. It is simply a matter of analyzing production reports to find jobs which are repetitive, either wholly or in part. When such jobs are found, a permanent operation standard can be written, which, in the case of a 100 per cent repetitive job would be essentially a reproduction of the maintenance production report, Fig. 1.

CHICAGO Plant — A. T. KEARNEY & CO. — 3/21 To 3/25 Date

PIPE SHOP Department — INDUSTRIAL ENGINEERING DEPT. — M. H. Prepared by

MAINTENANCE RECAP SHEET

Clock No. 501			Clock No. 502			Clock No. 503			Clock No. 504			Clock No. 505		
Job No.	Hrs. on Stds.	Std. Hrs. Prod.	Job No.	Hrs. on Stds.	Std. Hrs. Prod.	Job No.	Hrs. on Stds.	Std. Hrs. Prod.	Job No.	Hrs. on Stds.	Std. Hrs. Prod.	Job No.	Hrs. on Stds.	Std. Hrs. Prod.
12-1	4.0	3.8	12.2	11.0	9.8	123	2.5	2.6	12.1	4.0	3.8	12.2	11.0	9.8
5	13.0	13.3	7	7.2	8.0	11	3.1	3.4	5	13.0	13.3	7	7.2	8.0
6	16.0	19.0	8	5.8	5.4	12	2.4	2.1	9	11.5	10.7	8	5.8	5.4
25	7.0	7.5	9	11.5	10.7	13	8.0	8.5	10	4.5	3.8	9	11.5	10.7
			10	4.5	3.8	14	1.5	2.0	25	7.0	7.5	10	4.5	3.8
						15	2.6	2.5						
						16	3.9	4.2						
						17	5.2	5.4						
						18	2.8	2.7						
						19	3.0	3.4						
						20	3.0	3.1						
						21	2.0	DW						
							2.0	DW						
Total	40.0	43.6	Total	40.0	37.7	Total	38.0	39.9	Total	40.0	39.1	Total	40.0	37.7

Fig. 7. Sheets employed in calculating the individual performances of workmen

A large proportion of jobs fall in the semi-repetitive classification. For instance, take the job of checking and replacing leaky tubes in a condenser where this happens at regular intervals, which is often the case, and which requires four men for the better part of two days.

After this had been checked in detail once or twice, an operation standard was prepared and all elements combined into two total figures. One was the sum of all those elements which occurred each time the job was done, in other words, a job constant. The other was the sum of those elements which occurred when a tube was replaced. That is, a tube constant. The only information needed to cover the work of four men for two days was the number of tubes replaced. It is pretty obvious how great a reduction in time would be accomplished in this example for both the production checker and the standards clerk.

From this viewpoint, we find that a surprisingly large proportion of the work of most maintenance groups can be classified as repetitive or semi-repetitive in nature. These terms refer, of course, not to the actual work

(Continued on page 228)

Fig. 8. This is the maintenance standards report, a summary of the week's work and a comparison with last week's efforts by different individuals in the pipe shop

CHICAGO Plant — A. T. KEARNEY & CO. — 3/21 To 3/25 Date

PIPE SHOP Department — INDUSTRIAL ENGINEERING DEPT. — MAINTENANCE STANDARDS REPORT

Clock No.	Name	Class	Hours Total	Hours On D.W.	Hours On Stds.	Std. Hrs. Prod.	Performance Index This Week	Performance Index Last Week
501	JOHNSON	PF ½	40.0		40.0	43.6	109%	105%
502	WILLIAMS	PF ½	40.0		40.0	37.7	94	98
503	BROWN	PF ½	40.0	2.0	38.0	39.9	105	110
504	ADAMS	H	40.0		40.0	39.1	98	102
505	NORTON	H	40.0		40.0	37.7	94	96
	Department Total		200.0	2.0	198.0	198.0	100	102

Prepared by: MH — Approved by: G-M — % of Total Hrs. on Stds. — This Week: 99 — Last Week: 95

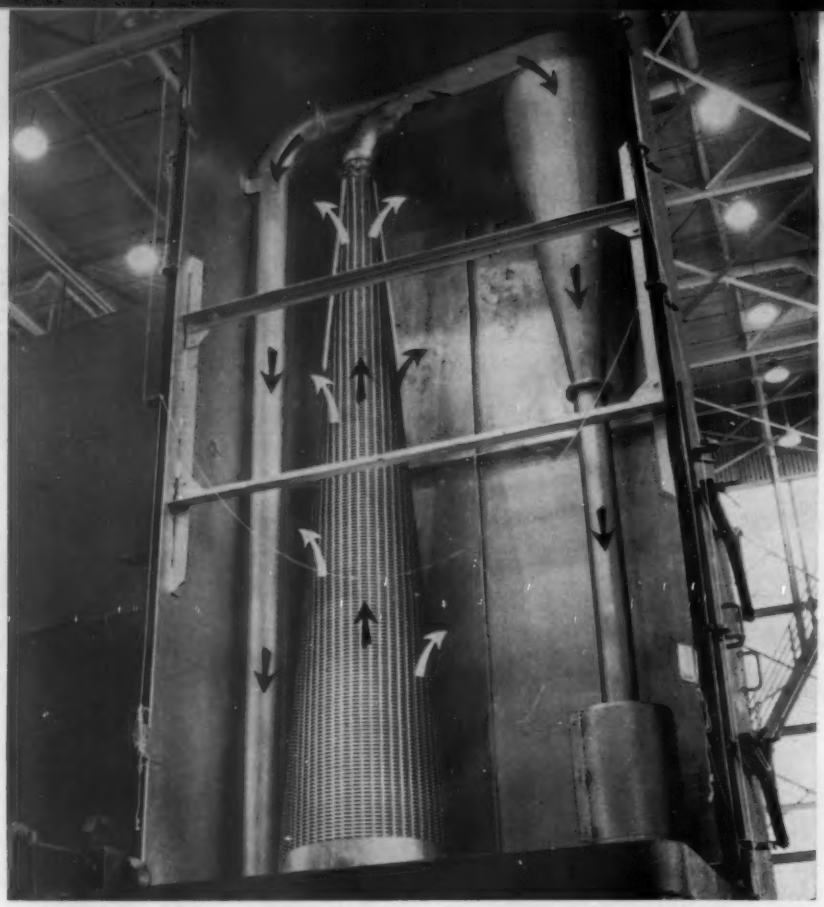


Fig. 1. Arrows give an idea of air flow through a dust collector from machining operations

From Dirty Air to "Country Air"—

Plymouth Plant Uses Down-Draft System

PLYMOUTH not only has "The Forward Look" in its cars but also in the V-8 engine plant on Mound Road. Among some of the unusual engineering features in evidence here are the down draft collecting systems for dust generated by cast iron machining. This method of air handling was fostered by people in the plant engineering department headed by Bill Allen. It was also the plant engineer's responsibility to select a collecting unit with outstanding performance characteristics to filter the air and return it to the plant.

The selection of a representative unit was done on a competitive test basis. Actual performance under plant conditions was to be an important factor in making a decision. Of course, the Plymouth Division already had experience in operating dust collecting units with cast iron machining operations. However, as good as the equipment was, the plant engineer did not consider its performance to be adequate for the new plant. He did not particularly care for the fine dust sheen that would be evident on plant surfaces after production would get underway. He was interested in a collector that would operate at 95 per cent efficiency and remove dust down to 0.3 microns in lieu of, for example, 98 per cent efficiency in the removal of dust particles in the 3.5 to 5 micron range.

Each one of the five competing dust collectors was tested under similar conditions. The units had their turn in replacing an existing dust collector that was working with a machine tool at one of the Plymouth Division plants. Each unit operated at a specified period of time under test observation. The company's Industrial Hygiene Department recorded the dust count of influent and effluent air.

One of the test units, running for one hour at 60 cfm had an efficiency of 99.8 per cent. The average size of particle at the discharge side was 0.3 microns. In this test, the collector used a viscous filter along with glass fiber media of two different densities. A filter, comprising both extra fine fibers and somewhat coarser ones was being used successfully to filter radioactive dust from operations dealing with atomic energy.

Results of the tests on the five units showed that three collectors were reasonably close in efficiency. As a matter of fact, two of these units compared very closely; however, one of these did a slightly better job while using 10 hp less energy to do the job. Based on rough calculations, this amounts to 10 cents per hour savings per unit. This could mean a three-shift cost savings of $146.40 per day.

The collector with the lowest horse power rating was also found to occupy the smallest floor area.

With the concentration of machinery in an automotive plant of this type, floor space naturally is at a premium and that too was an important factor in the final selection. Coupled with the other advantages, the cost of this unit was the lowest.

With the selection of the type of collector out of the way, the question of what would be the ideal size for optimum economy was considered. The plant engineer was informed that in the range of unit capacities from 10,000 to 20,000 cfm, there would be very little difference in cost per cfm of air handled. Outside this range it would be another thing.

It would also be unwise economically, to try to use for example, two 5,000 cfm units to take care of a flow of air of 10,000 cfm. In arriving at the size of the unit to be used an arbitrary allowance of 1,500 cfm of air per machine head was made. Plans also called for one air filtering unit to serve seven machines at the maximum. This is close to the capacity of the 10,000 cfm capacity unit and is the size that was selected. Face velocities at the heads will run about 1,500 fpm.

A representative collector installation uses a tunnel for its main inlet trunk line. The tunnel, which has a conveyor for disposing of cast iron chips, runs directly below a line of machines which straddle it. This dual purpose trough is covered with relatively air tight steel panels for ease of inspection and maintenance. There are roughly 5,500 ft of the drag chain conveyor for carrying chips to outside overhead bins, see Fig. 2.

The dust-laden air flows through a tunnel on the way to the aerodyne collector. This passageway serves as a plenum chamber with relatively low air velocity, allowing heavy particles to settle out.

After flowing through the fan in the collector, the dust-laden air enters a metal cone, Fig. 1, whose surface has been perforated to provide many air paths as well as change the direction of air flow. The heavier particles have a tendency to fall back into the stream inside the cone and go on into a cyclone. The lighter air from the cyclone exhaust opening at the top is returned to the fan and again enters the cone. In the meantime, the heavy dust particles drop through an air valve into the tunnel. The duct through which the particles fall from the collector is extended to a few inches above the drag chain conveyor to prevent re-entry of the particles into the collection system.

Air that has passed through the cone continues through the filter media where the very fine dust is removed and is returned to the room in an exceptionally clean state.

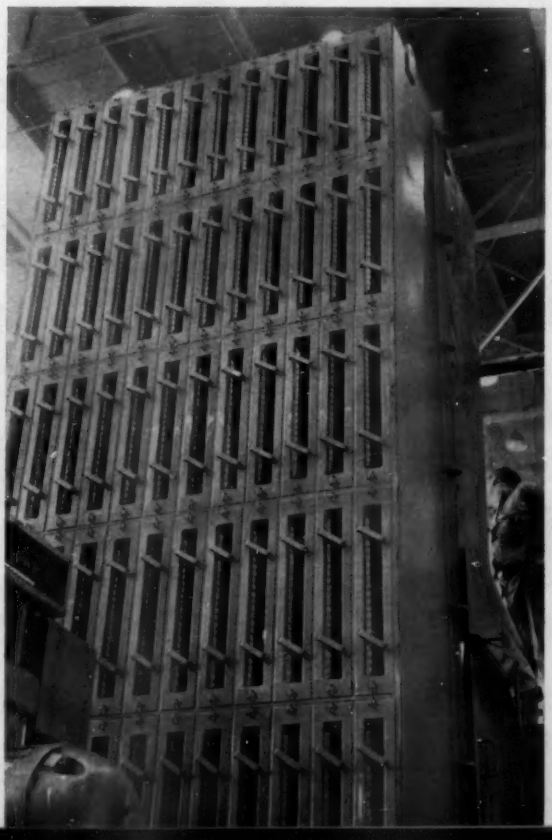
The time to change the filter media in a collector will be indicated by a differential pressure water column. Then, a section of the unit containing the filter bank will be removed and an overhead crane will pick up and carry it to an area where maintenance men can do the job away from the production floor.

Each of the filter elements consists of two collection surfaces set at an acute angle to each other, Fig. 3. This permits much more filtering area in a limited space. Replacement media come in roll form; this is cut to size and placed in the filter elements.

This is another case in which planning, comparing and sound reasoning on the part of the men in the plant engineering function were instrumental in selecting equipment that would do an exceptional job, economically. It could be said that this is an example of the scientific approach to an engineering problem. Good use was made, too, of a familiar yardstick of trying equipment before buying it. Of course, in testing something, you have to know what you are looking for and that is where good plant engineering counts.

Fig. 2. Drag-chain tunnel which serves as dust collecting duct

Fig. 3. Cleaned air returns to plant through this filter bank



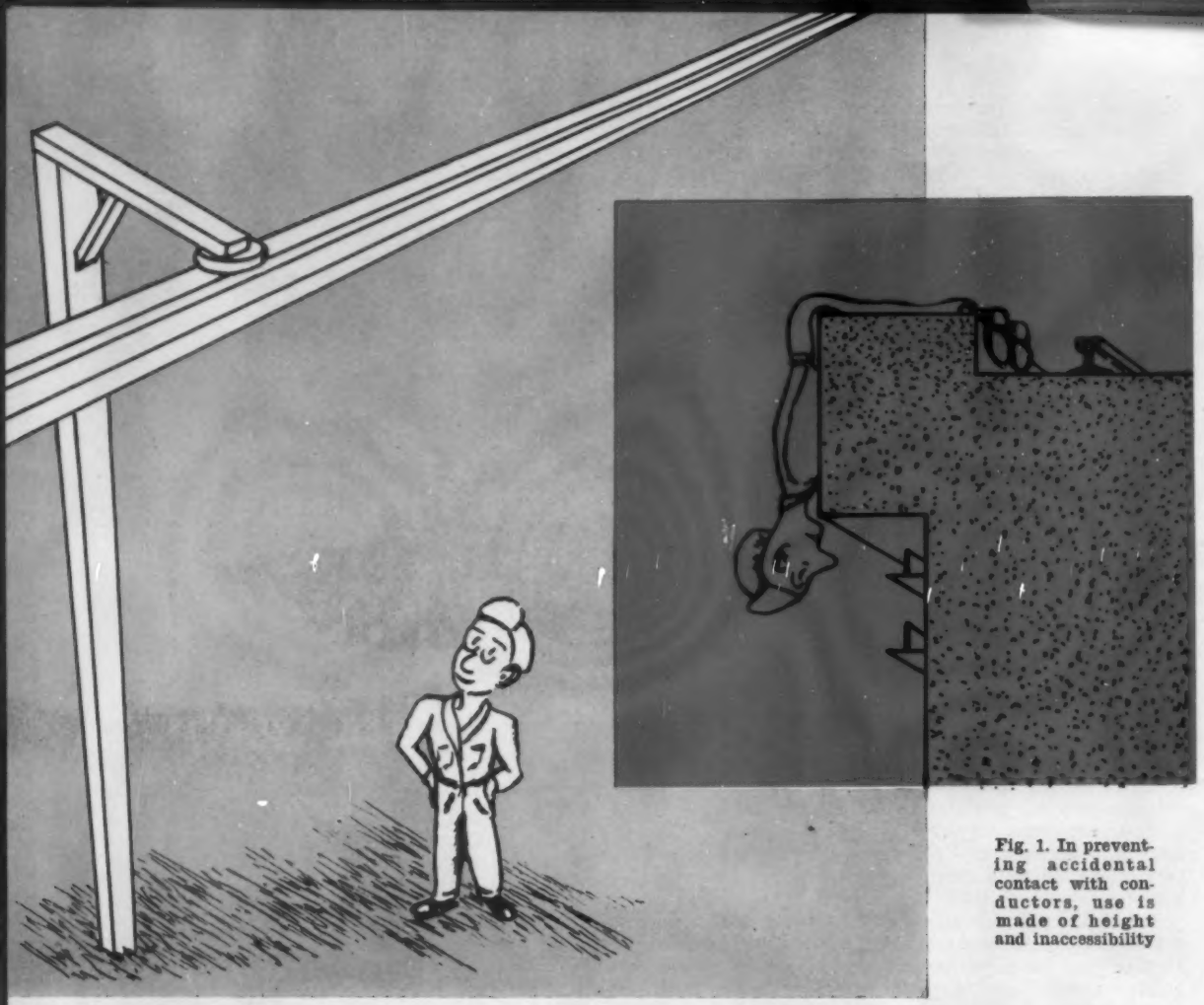


Fig. 1. In preventing accidental contact with conductors, use is made of height and inaccessibility

How Safe Are Third Rail Systems?

Here are Several Having Various Degrees of Protection

By H. YALE MAGEOCH, Chief Engineer, Electric Service Mfg. Co., Philadelphia, Pa.

AMONG THE MANY PROBLEMS of engineering and installation of electrical materials is that of safety. In this respect, the design and installation of a third rail system should be studied carefully.

There are numerous ways of providing safety for such a system. When third rail systems were first installed, little thought was given to adequate protection to personnel. Often signs were employed which merely read "Live Wire," "High Voltage" or other words of warning. This left the entire idea of safety to the discretion of those in the vicinity of the live conductor.

One of the most universally used means of providing safety is to mount the conductors high enough so that they are not readily accessible to persons working in the vicinity. Height is one of the principal safety means employed by crane builders and operators, Fig. 1.

Guard boards have been employed widely where third rails must be located at ground level. These are located in such a fashion that they serve as a barrier between the live rail and persons in the area. An opening must be provided so that the collectors may contact the rail. This system is not by any means fool-proof. If suitable care is not exercised on the part of the personnel, it may be easy for them to come in contact with the conductor, thus resulting in a serious shock.

Such a system has been the best that has been available in the past. However, improved methods of transferring current safely have been developed. For typical under-running and over-running guard systems, see Fig. 3.

The plow system has been used in ship yards and by other manufacturing industries where a clear and safe area is required for the movement of workers and machinery, Fig. 2. It is reasonably safe. However, the maintenance cost required to keep the system in operation has been a source of complaint in the past. The cost of installation is also a factor which discourages its use.

Conductors, employing a partial insulating covering whereby the under surface remains exposed, are represented by ASCE rails employing fibre or wooden covers. Such installations are used in public transportation systems. However, recent types of conductor systems developed for industrial hoist use employ an insulating cover of synthetic rubber or plastic. The cover provides major protection for the upper and vertical surfaces of the conductor, Fig. 4. This type of system does not, however, offer the degree of safety that the plow system has.

Totally Enclosed

Totally enclosed conductors, arranged with a flexible, rubber-like jacket designed with a shelf-closing slot at the bottom, provide a greater degree of protection against personal contact than the partially insulated systems. Referring to Fig. 5, it can be seen that, with a suitable collector, the slot at the bottom of the enclosure may be forced open permitting the supporting bracket of the collector to pass. It is believed that this arrangement has a size limitation and has not been made available for current in the 100 amp area.

A number of systems are available which employ a sheet metal enclosure housing the conductors throughout their length. Associated with the enclosure is a trolley member, with suitable contacts, for engaging the conductors. These systems offer a high degree of safety and, at the same time, result in simplification of installation. Systems of this type have a relatively narrow slot at the bottom which minimizes the possibility of contact with the live conductor by personnel, Fig. 6.

A similar system has been developed employing a cover with side opening. This opening developes a labyrinth through which the collector arm must pass before it reaches the conductor area. An effort is made, in this case, to further increase the difficulty of accidental contact with the conductors in the enclosure, Fig. 7.

The distributed contact system is relatively new, although the basic idea has been employed in the past. Figure 8 shows a series of posts on which shoes are carried. Each post is stationary, in this case, and a rail section, sufficiently long to bridge at least two posts, is carried on the moving equipment. By means of suitable contactors and control shoes at each post, voltage is removed from all shoes not in direct contact with the moving rail. By actually disconnecting the current from the idle shoes, it can be seen that the element of risk to personnel by contact with the live shoes is removed.

Installations of this type avoid the fence-like barrier that exists with other

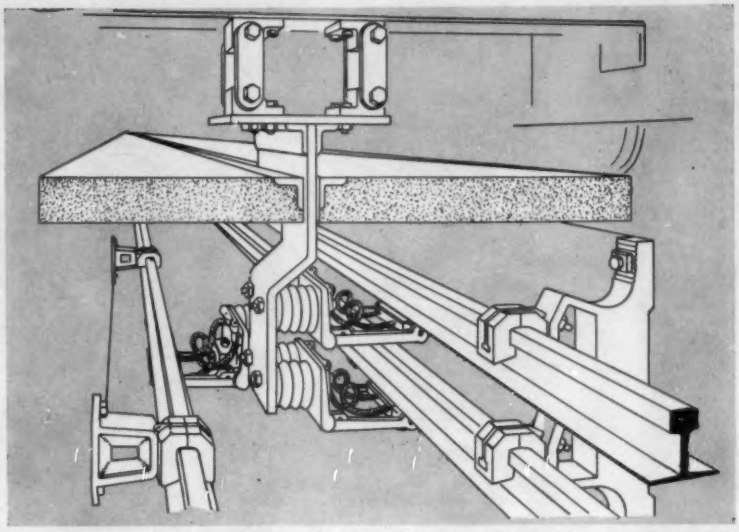


Fig. 2. The plow system used in shipyards and other industries is relatively safe

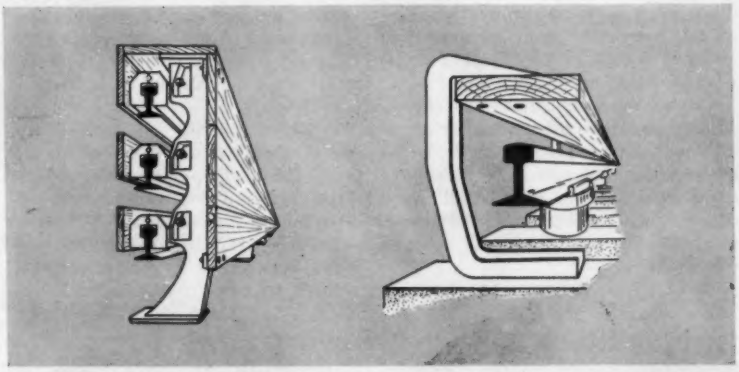


Fig. 3. Left to right are examples of under and over running guard board systems

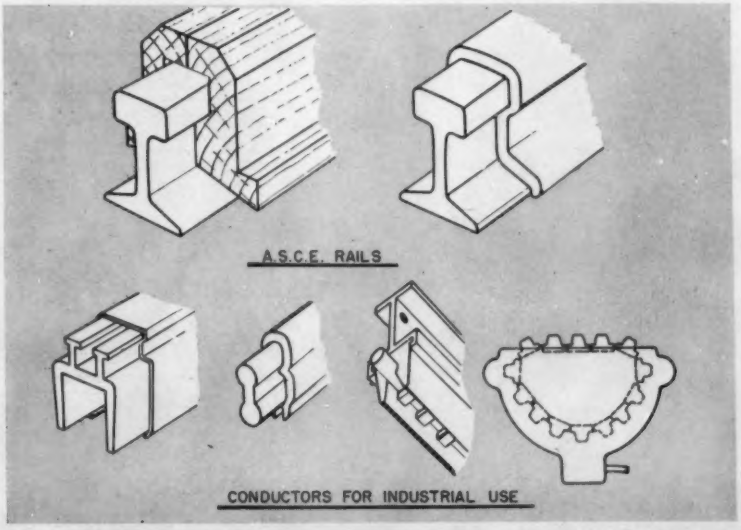


Fig. 4. Example at bottom right is unusual collector for conductor at near left

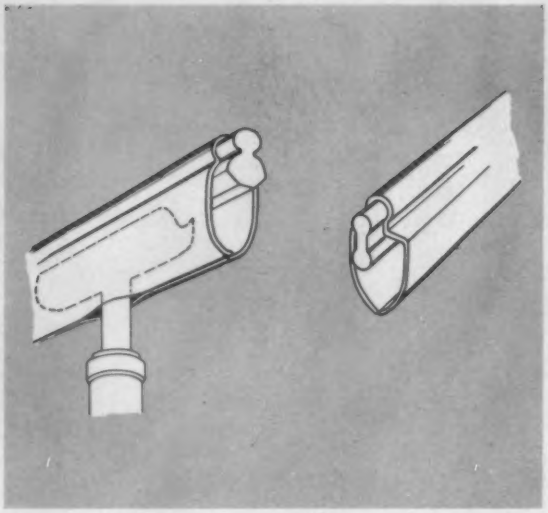


Fig. 5. The flexible material jackets enclose the conductors

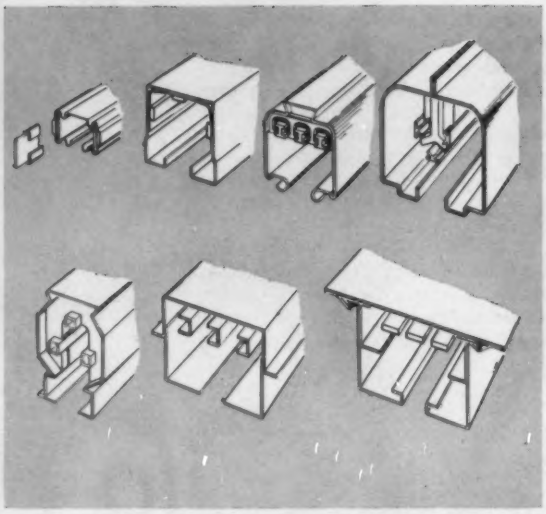


Fig. 6. Multiple conductor systems with slot in the bottom

conventional systems installed at ground level. This type of arrangement offers high degree of safety. Systems of this type have been designed for voltages as high as 4160 v, three phase with the basic circuit shown in Fig. 9.

The use of sectionalized conductors in a system does not necessarily offer a means which provides a high degree of protection. By isolating certain sections, repairs can be made on idle portions while other sections are in operation. This feature provides a certain element of safety.

An effort has been made to describe special systems now available or ideas embracing safety which have been used in the past. In the ensuing passages, consideration is given to open systems; however, some of the comments made will also relate to the special systems.

When considering electrical safety, one of the first considerations should be the use of the proper circuit breaker or fuses for overload or short circuit protection.

Suitable clearance should be provided between live conductors and ground or other live conductors to prevent short circuit or grounding due to industrial dirt or other materials or foreign matter that might reach the conductors or insulators.

All metal structures used for insulator support, should be thoroughly grounded in order to avoid shock to personnel due to faulty insulators or excessive leakage across the insulator surface.

While third rail systems are usually considered to be dangerous from the electrical point of view, it is possible that failure to observe good practice mechanically may result in injury to personnel. Thus, a few thoughts on mechanical safety are offered.

When installing a new system, provide suitable mechanical clearance for all working parts. It should be remembered that any device moving on rails will, with respect to the third rail, shift both vertically and horizontally. Therefore clearance must be provided to allow for the maximum shift.

This type and spacing of insulators with their associated hardware, used to support the conductor, should be such that, in the event of failure of one insulator, the remaining adjacent insulators will support the load.

In situations where persons are working under the conductor installation, it may be advisable to allow two adjacent insulators to break and require that the remaining insulators support the load without failure.

Insulators installed at the free end of the conductor system should be stronger than the intermediate insulators employed. Or, for the sake of uniformity, it may be wise to install two insulators of the intermediate type closely spaced near the end of the conductor.

The reason for this suggestion is

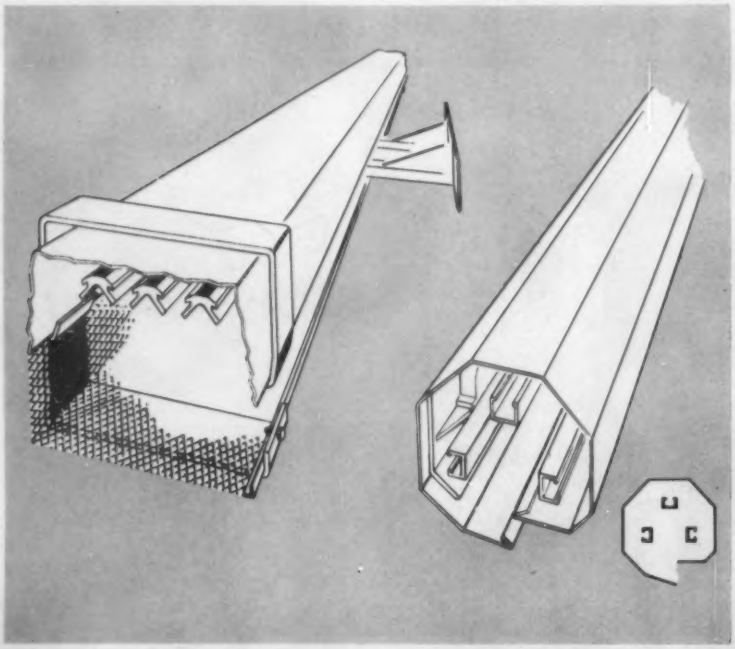


Fig. 7. Left to right, the side and indirect slot designs give added protection

that in the event of failure of the end insulator, stripping down of the conductor is a possibility. Failure of the end insulator imposes a heavy load on the adjacent insulator which is then called upon to support the conductor against the cantilever load imposed.

Rigid conductors, supported by insulators particularly of the brittle type, should be installed so that the insulators are not pre-stressed.

This means that the mounting surface upon which the insulators are installed should be in alignment with a minimum of twist. Thus, when the insulators are mounted and the hardware attached to the rigid conductor, the insulator will not endeavor to force the conductor to follow the irregular path of the mounting surface.

Structures used to mount conductor supporting insulators, which are subject to weaving or settling, contribute to insulator breakage. Inadequate provision for expansion or contraction of conductors may result in failure of the conductor's supporting components, causing them to break and drop to the ground.

In cases where there is excessive vibration or heavy impact loading, brittle type insulators should be avoided unless they are protected by shock or impact absorbing means, or unless the insulators are used to support very light loads.

Preventive Maintenance

Preventive maintenance, according to an established schedule, affords the greatest measure of safe operation that can be secured. The replacement or maintenance of parts must, by necessity, be based on past experience with the installation or similar installations. A practice should be made to determine the satisfactory life of contacts used and other elements so that replacement may be made before ultimate failure takes place.

If contact shoe life is too short, this condition may be corrected by employing two or more collectors in parallel. This practice should give better shoe life if wear is due to electrical causes. Should the wear be due to mechanical reasons, add a collector and reduce the contact pressure on the collector shoes.

By use of multiple collectors, the maintenance job under emergency conditions may be decreased by tying down the offending collector. This permits the shoes remaining in contact with the conductor to carry the load until a satisfactory shut-down period can be established. When working on collectors or conductors, it is good practice, for safety's sake, to remove fuses from the safety switch or employ other means to guarantee that current will not be accidentally turned on.

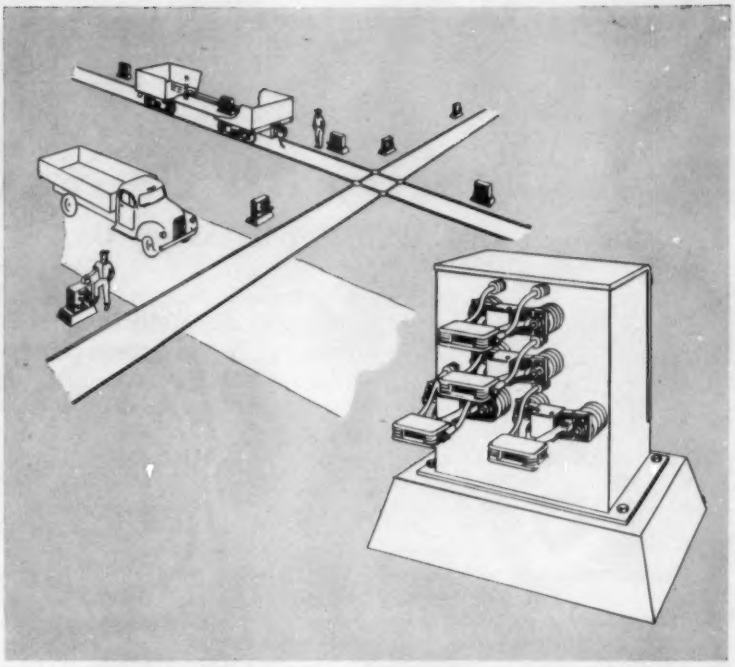


Fig. 8. Layout shows distributed contact system. In lower right is unit closeup

The conductor rail should not be used as a "cat walk" as the resultant live load may cause insulator failure. It is never known when an insulator has failed mechanically for by casual observation it may appear to be good. If insulators are heavily pre-stressed or if too light for the service intended, failure might occur.

Do not use the overhead conductor as a means for supporting ladders or as a means for supporting chain hoists or block and tackle for lifting loads.

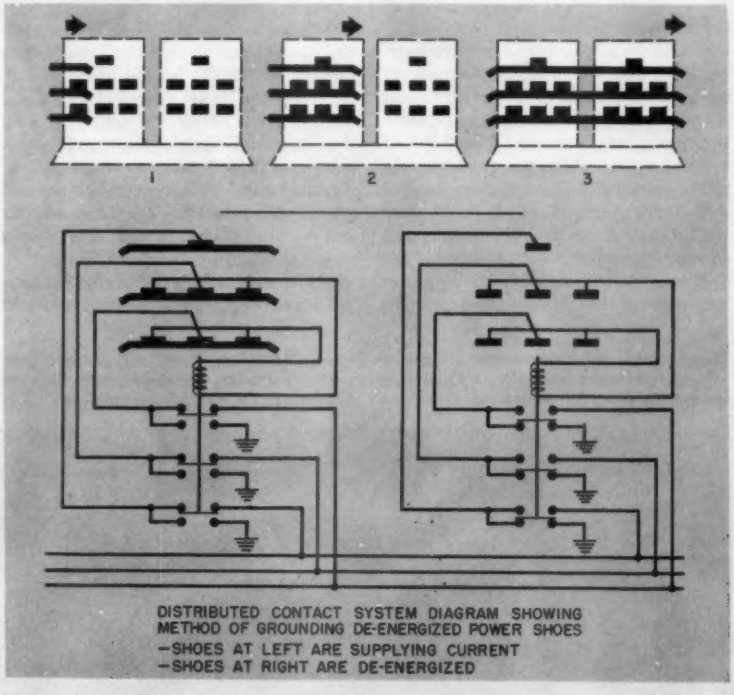


Fig. 9. At the top is progressive movement of rails. The coil shoes touch first

High Capacity Air Conveying

Cuts Labor Costs At Miller Brewing Co.

Operating economy and cleanliness plus low malt grain damage all contribute to higher product quality at low cost . . . New system performs entire bulk-handling function from boxcars to primary storage to process . . . Complete enclosure of the system prevents contamination

BOXCARS OF MALT are unloaded in 65 minutes . . . grains are rushed from storage to process at 10 tons per hour—both take place in completely enclosed systems that are dust-free, contamination-free, self-cleaning.

Modern, efficient handling like this takes place at the enlarged Milwaukee brewery of the Miller Brewing Co. As in many plants, pneumatic conveyors are responsible for this high-capacity but low-cost handling.

In making plans for an expansion of facilities which would double their output, Miller officials were determined to achieve the maximum production efficiency commensurate with quality of product. An important factor affecting this was the cost of handling incoming raw materials, brewing grains, from boxcar to process with intermediate storage.

Miller preferred to use a pneumatic conveyor for this purpose because of its outstanding operating economy and cleanliness, if such a system could meet two basic requirements. First, it had to have a high enough rate of flow to keep the new facilities amply supplied with brewing grains at all times. Second, it had to hold down malt grain damage to conform with Miller's strict quality control. Any crushing or breakage of the malt kernel reduces its effectiveness as a filter aid in the lauter tubs. Powdering of the malt results in loss of extract. In their search for a pneumatic conveyor which would satisfy these conditions and still convey the grain fast enough to meet production requirements, Miller called in materials handling engineers of Dracco Corp.

These engineers tackled the problem and designed a system for Miller which conveys the grain at a remarkable high-capacity rate of over 50 tons an hour. Full boxcars containing 102,000 lb of malt are unloaded in one hour and five minutes from beginning of preparations to completion of clean-up. Actual conveying time is one hour, a reduction of 20 minutes from the time needed by the old bucket-type unloader.

Accomplishing this involved a special technique previously used with success to handle friable materials in other brewery and chemical plant installations—a cushion of air to prevent the sharp collision between grain and pipe-line which damages the malt. Careful engineering and balance of all operating factors was necessary to achieve high capacity with this minimum breakage.

Miller's new system performs two vital handling functions: (1) unloading five to seven boxcars to primary storage each day and (2) transporting from primary storage to process. At this point, no further bulk-handling of dry materials is needed.

In the unloading stage, a suction-type conveying system removes malt from boxcars using four five-inch flexible hoses and intake nozzles. These four hoses merge into one 14-in. conveying line which carries the malt at a rate of 51 tons an hour from the rail terminal to a giant receiving station located in a roof penthouse, a vertical distance of some 200 ft. The receiver separates materials from the conveying air and filters the air before it is exhausted to the atmosphere. The malt drops to the base of the receiver and passes through a rotary feeder for distribution to the four storage bins, each six stories in height. The suction for the system is provided by a Roots-type blower driven by a 200 hp electric motor.

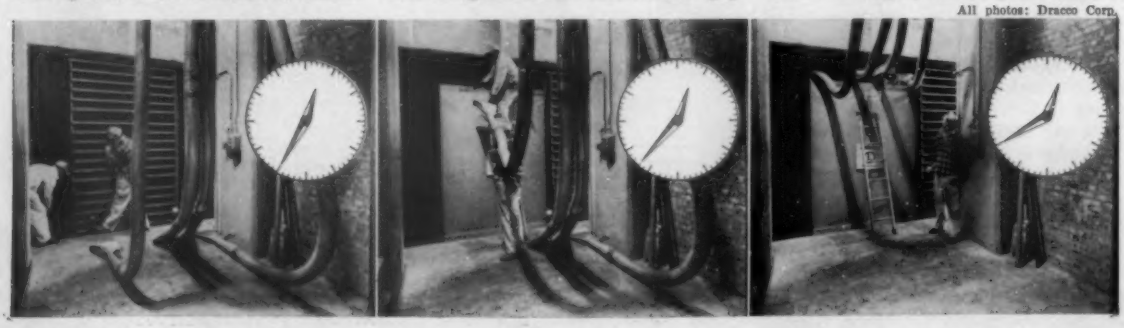
Two separate suction-type conveying systems, each complete in itself, are used in the transporting of malt and grits from primary storage to the brewing process. At the start of the malt system, malt grains are fed from the eight storage bins, blended on a belt conveyor and moved to an intake hopper at which point the malt is

Time: 12:35 pm. Employees commence boxcar unloading operations. First step is to open door for insertion of nozzles

Time: 12:37 pm. Ladder is hooked into paper partition holding grain in car. Unloading nozzles are inserted into gap

Time: 12:40 pm. With nozzles in place and starting signal given unloading starts. All employees manipulate nozzles

All photos: Dracco Corp.



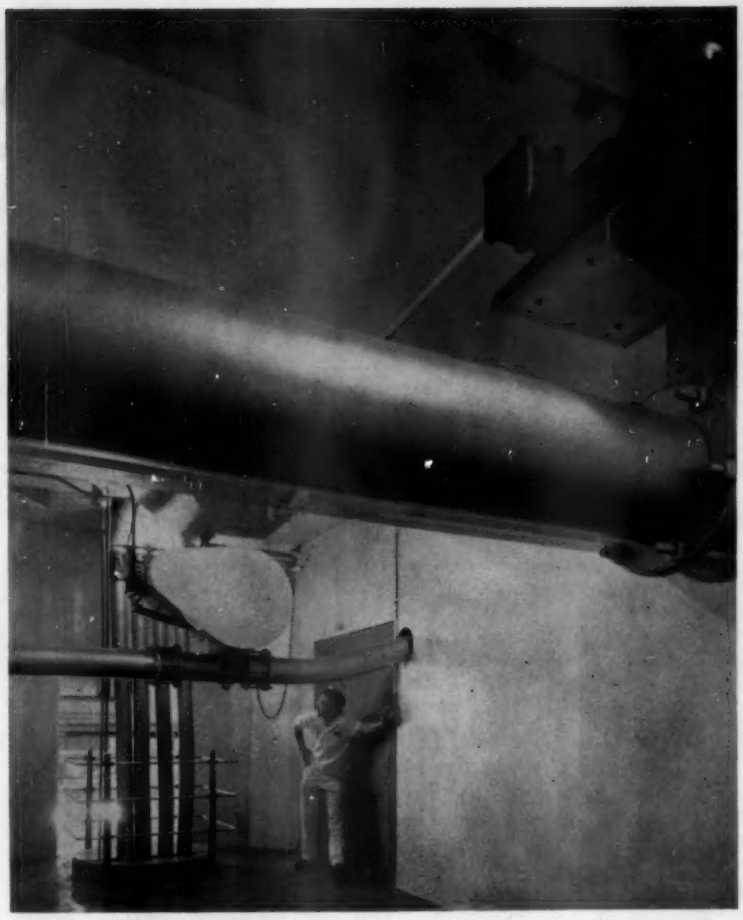
sucked into the air conveying line. It is conveyed in the line from the second to the ninth floor, 125 ft vertically, to the malt receiver at a rate of ten tons an hour. From here, it is discharged directly into processing bins.

The grits system differs from the malt system only in method of pick-up and handling capacity. Grits are discharged from four storage bins directly into the pneumatic conveying line and transported at 7½ tons an hour to another receiver, identical to the one used for malt. Discharge to process is accomplished in the same manner as with malt. Suction is provided in each system by a Roots-type blower powered by a 50 hp electric motor.

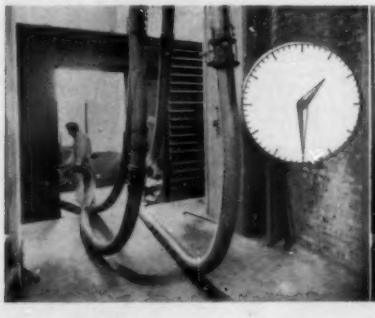
To avoid interruptions in storage-to-process operations for maintenance care, either system can be quickly converted to handle both grits and malt while the other is shut down. Flexible hose couplings, set up side-by-side in the two conveying lines, permit switching over of the line leading from the malt intake hopper into the grits line, or vice versa. One receiver then collects both materials at alternate intervals. This dual use presents no problem as the self-cleaning action of the airstream removes all trace of material prior to change-over. Emergency discharge chutes from the feeder located at the base of each receiver permit selective feeding of malt and grits into separate processing bins.

The complete enclosure of each system prevents contamination from outside sources as well as loss and waste of grain. These suction-type systems have an important advantage over pressure-type conveyors. With less than atmospheric pressure in the lines, no dust can escape from the system. Another vital advantage is that the moving stream of air cleans the interior of the system automatically. Grains are never left in the conveying line where they might germinate or become infested. No moving parts come into contact with the grains, hence no contamination from lubricants. These pneumatic conveyors are flexible and space-saving. They may be designed to fit new or existing plant structures since walls and floors are no obstacle.

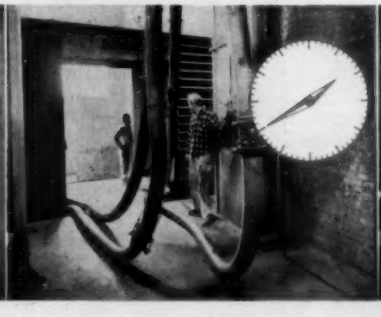
Pneumatic conveyors make possible considerable savings in labor costs because of their simplified, automatic operation. Only two men are needed to manipulate the unloading nozzles at Miller's. Intake devices are entirely free from mechanical moving parts which could endanger the safety of operating personnel. As a result, the newly-opened section of the Miller Brewery is equipped with one of the most up-to-date examples of materials handling efficiency.



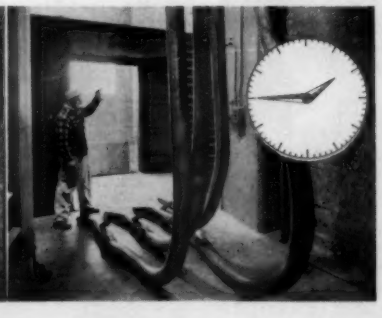
This is a view of the grits discharge area. Conveying line shown in upper foreground makes a U-shaped path to collect grits from each of the four storage tanks



Time: 1:30 pm. The car is almost empty and the paper wall has been removed. Workmen are cleaning up last traces



Time: 1:40 pm. The suction is now turned off as workers have completed unloading. Note cleanliness of car floor



Time: 1:45 pm. The signal is given to remove the empty box car and to spot next one. Seventy minutes have elapsed

Small Plant Hires Electronic Clerks

Result: $200 per Month Maintenance Record System

By E. R. HALKER, Maintenance Supervisor, Niles Glass Works, General Electric Co., Niles, Ohio

NO SINGLE preventive maintenance system will completely fit all plants, and to develop the system best suited for Niles Glass Works, a number of various systems were investigated. Some of the most applicable parts of our system were taken from General Electric Apparatus Service Shops Productive Maintenance System.

The major difference in our system from the other systems checked is the utilization of punched cards for tabulating and recording maintenance hours and equipment records. This information is readily available in typewritten reports so that we can thoroughly analyze our maintenance program, at a cost less than the salary of a clerk who would have been required if punched cards had not been adopted.

This cost, about $200.00 per month, is the amount we pay Remington Rand, Inc., for "rental" of the punched card facilities at their Pittsburgh offices.

Our production is a 3-shift, 5-day week operation. However, our maintenance is run on a one-shift basis. If maintenance is required on the other two shifts, our men are called in.

The organization chart shows the two distinct breakdowns of maintenance—Machine and Plant Maintenance. Machine maintenance includes maintenance of all production equipment used for the manufacturing of incandescent light bulb glass envelopes. Plant maintenance includes upkeep of building and grounds, all piping, electrical, ventilating and cooling systems, freight and bucket elevators, conveyors, raw material handling and mixing equipment, material handling equipment, including electric trucks, welding and other miscellaneous work.

We have six separate maintenance shops, each controlled by a group leader who is directly responsible to the maintenance foreman.

In order to be able to record and identify our shops, activities, equipment, job classifications, job numbers and work classifications, we worked out a code that would simplify our records and also work in with the punched card system. The following tells how this was accomplished.

As was mentioned before, we have six distinct shops and have assigned the following numbers to them.

Machine Shop	— No. 1
Boiler Room	— No. 2
Carpenter Shop	— No. 3
Electric Shop	— No. 4
Pipe Shop	— No. 5
Tin Shop	— No. 6

When any work is done by employees in any of the above shops it is charged to the proper activity, which is coded by a letter. For example:

A—Tank	I—Buildings
B—Mixing	J—Boilers
C—Melting	L—Auxiliaries
D—Blowing	M—Shop Equip.
E—Frosting	N—Shipping

Emergency, general, preventive and new work are the four job classifications.

Emergency work is unscheduled work that requires immediate attention. It also includes all call-ins.

General work is work of a general nature such as cleaning shop areas, unloading raw materials, conferences, water test, etc.

Preventive work is all work that is necessary to maintain the equipment to prolong its useful life. This includes periodic mechanical inspections and lubrications that are controlled by inspection cards. These cards are kept in a tickler file to signal the proper time for inspections.

New work is work done that incorporates new equipment, ideas or methods that revise or change the present means of doing the operation.

In assigning job numbers, we found that there were routine periodic jobs that should have a standing job number, while other jobs would require individually assigned number. The standing jobs were allotted job numbers from 1 to 100. Using these numbers as such, we are able to accumulate the total number of hours required per year for specific jobs. For instance, we have available information to determine the number of hours required to replace light bulbs, because all "lamping up" is charged as job G-12.

Jobs that are not covered by standing job numbers are jobs that have been submitted either by foremen of other departments or by maintenance department personnel.

These jobs are submitted on a prepared Maintenance Shop Order form in triplicate. This form is reproduced in Fig. 6, upper left. When the maintenance foremen receive this work order form, it is assigned one of a series of numbers from 100 to 1,000. One copy of the work order form is then returned to the originator with remarks indicated as to possible time of completion. After the job has been completed, the second copy of the original order form is returned as a notification to the original issuer that the job is completed.

In addition to being issued a number, jobs are also assigned a job classification, that is they may be emergency, general, preventive or new work. An example of a preventive job would be P100 where a job covering new work would be N101.

Work classification is a description

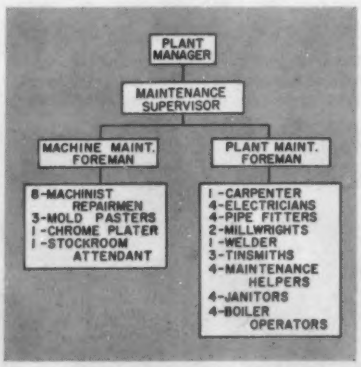


Fig. 1. Organization chart of maintenance department at Niles Glass Works

About the Author

E. R. Halker has worked at the Niles Glass Works for the past 16 years, gaining experience in each of the shops in the maintenance department. With this background, he assumed the position of Maintenance Supervisor six years ago, after his return from four years of military service.

In addition to his many daytime activities, he has been attending night school at Youngstown University, and is at present a member of the Senior class in Mechanical Engineering.

of the type of work done. This was coded using numbers from 10 to 100. An example of this is number 10, which means adjusted. If an employee adjusted a conveyor belt all he would write on his daily time card to describe the work would be the number 10. Using a coding system of this type eliminates a lot of unnecessary writing and also, each employee is expressing himself in the same terms.

The first step after setting up the coding system was to make a Master Equipment Record. This is a complete listing of all equipment in their proper activities by their assigned equipment numbers. These listings were made up and indexed in book form to be distributed in the maintenance shops.

We used three groupings for listing our equipment: facility, auxiliary and component. *Facility* is a general grouping of all equipment that is required to accomplish a phase of the operation. *Auxiliary* is a piece of equipment that is part of the facility. *Component* refers to a specific part of the auxiliary piece of equipment or an additional piece of equipment that is required to go along with the auxiliary. The Master Equipment Record form, Fig. 3, shows this breakdown.

Record Card Files

After all equipment was assigned numbers, an Equipment Record Card was made for each individual piece of equipment. These cards are filed in a card system by their activities. A sample card is shown in Fig. 5.

The other record card that we have is our Motor Record Card. On these cards we have listed all the data pertaining to each particular motor. These cards are kept with the Equipment Record cards if the motor is in service or in a separate spare motor card file. To be able to easily classify and identify a motor, we assigned each motor a number. These numbers have as a prefix a letter of the alphabet to identify the horsepower. For example, one horsepower motors are assigned the letter G, therefore, our one horsepower motors would be G1, G2, G3, etc., using consecutive numbers.

For d-c motors we use the same coding system except for a different colored card, easily identified.

Gearmotors, in addition to the one letter of the alphabet, are assigned the prefix letter X. For example, a one horsepower gear motor would be identified as XG1, X indicating gear motor, G the horsepower and 1, the number of the motor.

Now that all equipment, activities, jobs, etc., are coded, just how does it work into our punched card system?

Our method of recording the work

CODE NUMBERS

SHOP NUMBERS	STANDING JOB NO.	WORK CLASSIFICATION NO.	
1. Machine Shop	1. Lubrication & Mechanical Checks	10. Adjusted	28. Reamed
2. Boiler Room	2. Routine Maintenance	11. Assembled	29. Rebushed
3. Carpenter Shop	3. Motor Repairs	12. Burnout	30. Repaired
4. Electrical Shop	4. Water Test	13. Cleaned	31. Replaced
5. Pipe Shop	5. Mahoning Work	14. Conference	32. Saved
6. Tin Shop	6. Raw Materials	15. Dismantled	33. Stripped
9. Outside Service	7. Coal Handling	16. Drilled	34. Tested
	8. Trash Removal	17. Fabricate	35. Type Change
JOB CLASSIFICATION	9. Union Business	18. Hauled	36. Vented
E - Emergency	10. Chrome Plating	19. Inspected	37. Welded
G - General	11. Mold Pasting	20. Installed	38. Wired
P - Preventive	12. Lamp Up	21. Lapped	39. Unloaded
N - New Work	13. Elevator Inspection	22. Lubricate	40. Stocked
	14. Safety & Housekeeping Insp.	23. Machined	41. Misc.
	15. Fire Inspection	24. Packed	42. Checked
	16. Stockroom Att.	25. Painted	43. Stored
	17. Type Change	26. Pasted	44. Drained
	18. Machine Setup	27. Plate	45. Removed
	19. Call In		

Fig. 2. Key to the system is code which translates job descriptions into numbers

MASTER EQUIPMENT RECORD

Activity Classification B Name of Activity Mixing

Engineer's Bulletin Dated ... Bulletin Date June 1, 19[illegible] 3

Equipment Number			Equipment Description
Facility (1)	Auxiliary (2)	Components (3)	(4)
100			Raw Material Equipment
	101		Raw Material Elevator
	102		Power Shovel
	103		Raw Material Cross Conveyor
	104		Mixing Silo
	105		Yale Hopper Scales
	106		Ransome Mixer
	107		Cyclone Dust Collector
	108		Redler Conveyor
	109		Cullet Elevator
	110		Cullet Storage Hopper
200			Mixed Batch Equipment
	201		W[illegible]
400			[illegible]llet Reject Conveyor -,
	401		Unit "C" 30" Cullet Reject Conveyor
	402		Unit "B" 24" Cullet Reject Conveyor
	403		Unit "A" 24" Cullet Reject Conveyor
	404		Unit "J" 24" Cullet Reject Conveyor
	405		Unit "H" 24" Cullet Reject Conveyor
	406		Unit "I" 24" Cullet Reject Conveyor

Fig. 3. Series of Master Equipment forms numerically classifies plant equipment

MECHANICAL AND LUBRICATION SCHEDULES

ACTIVITY B EQUIPMENT 101

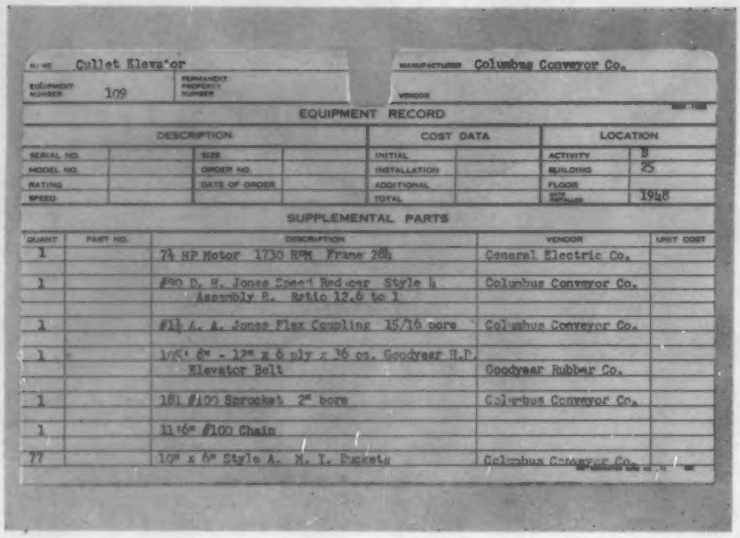
Item	Detail of Equipment	Work to be Performed: Shop	Description	Sch.	Week 1	2	3	4	5	Month
1	Belt & splice	6	Check	W						
2	Buckets	6	Check	Q	x					1-3-6-9
3	Head shaft bearing	6	Sovarex #1	M		x				
4	Tail shaft bearing									
5	Monarch pulley									
6	Chute lining									
7	Motor bearings									
8	Motor coupling									
9	Motor sprocket									
10	Drive chain									
11	Brake									
12	Jones speed reducer									

INSPECTION RECORD — Equipment No. 101 — Activity B

Report any unusual conditions to your Foreman, and check in column X for items needing additional attention.

YEAR 1955	JAN.			APRIL			JULY			OCT.			YEAR	JAN.			APRIL			JULY			OCT.		
	Wk.	Insp.	X	Wk.	Insp.	X	Wk.	Insp.	X	Wk.	Insp.	X		Wk.	Insp.	X	Wk.	Insp.	X	Wk.	Insp.	X	Wk.	Insp.	X
	1	JBD																							
	2	JBD		2	JBD																				
	FEB.			MAY			AUG.			NOV.				FEB.			MAY			AUG.			NOV.		
	Wk.	Insp.	X	Wk.	Insp.	X	Wk.	Insp.	X	Wk.	Insp.	X		Wk.	Insp.	X	Wk.	Insp.	X	Wk.	Insp.	X	Wk.	Insp.	X
	2	JBD		2	JBD																				
	MARCH			JUNE			SEPT.			DEC.				MARCH			JUNE			SEPT.			DEC.		
	Wk.	Insp.	X	Wk.	Insp.	X	Wk.	Insp.	X	Wk.	Insp.	X		Wk.	Insp.	X	Wk.	Insp.	X	Wk.	Insp.	X	Wk.	Insp.	X
	1	JBD		1	JBD																				
	2	JBD		2	JBD																				

Fig. 4. Working from schedule card, mechanic marks action on inspection record



Cullet Elevator — Columbus Conveyor Co.

EQUIPMENT NUMBER 109

EQUIPMENT RECORD

DESCRIPTION				COST DATA		LOCATION	
SERIAL NO.		SIZE		INITIAL		ACTIVITY	8
MODEL NO.		ORDER NO.		INSTALLATION		BUILDING	25
RATING		DATE OF ORDER		ADDITIONAL		FLOOR	
SPEED				TOTAL		DATE INSTALLED	1948

SUPPLEMENTAL PARTS

QUANT	PART NO.	DESCRIPTION	VENDOR	UNIT COST
1		7½ HP Motor 1730 RPM Frame 284	General Electric Co.	
1		#20 D. H. Jones Speed Reducer Style A Assembly B. Ratio 12.6 to 1	Columbus Conveyor Co.	
1		#1½ A. A. Jones Flex Coupling 15/16 bore	Columbus Conveyor Co.	
1		10½' 8" - 12" x 6 ply x 36 cs. Goodyear H.D. Elevator Belt	Goodyear Rubber Co.	
1		181 #100 Sprocket 2" bore	Columbus Conveyor Co.	
1		11'6" #100 Chain		
77		10" x 6" Style A. M. T. Buckets	Columbus Conveyor Co.	

Fig. 5. Typical equipment record from Kardex file. Motor cards are similar

done on each piece of equipment is to have each maintenance man record his time and information on a prepared maintenance record form.

A lot of maintenance supervisors may not completely agree with our method of having each man record his daily work. We feel that this man is the one who actually knows what he has done that day and what pieces of equipment that he worked on. One question that would undoubtedly be asked is, "How can each man know all the equipment numbers and other coding required to properly fill in the maintenance record form?" We have all this information in book and indexed form in each shop. Furthermore, each shop has its own specific jobs, which usually limits that shop's work to certain pieces of equipment with which the men become familiar.

Reference to the sample Maintenance Record Form, Fig. 6, will show how the coding system works in filling out the forms.

Under the remarks section, if the coding system does not completely explain the work done, a brief description can be filled in, up to a total of 19 letters. For example, an employee installing new pipe would fill in the work classification column with the number 20. This means he installed something on the piece of equipment that was indicated in the equipment column but does not specifically state what he installed. So in the remarks column he writes in the word pipe.

The time worked is broken down into regular hours which represents the normal 8 hour weekly work day. If any work is done beyond the 8 hours or on Saturday or Sunday, the hours are listed as overtime.

All parts withdrawn from stock are charged to the job and equipment that they are used on. This information is filled in by the stockroom attendant on a Material Requisition form, Fig. 6. Business Machines are used then to sort these parts by equipment numbers and then they are charged directly to that piece of equipment as part of its history record. As shown by the example, 22 ft. of 16-in. pipe and two 16-in. elbows were used by employee 138 when he installed a pipe cross on equipment 3107, on July 31.

After the Maintenance Record and Material Requisition forms are completed, they are sent in weekly to the Business Machine Section office of Remington Rand Inc. Here the information is taken from the forms and punched into cards. When a month's supply of cards has been punched, they are used to run off typewritten reports.

Cost of these reports is based on the number of cards processed, and our average cost has been approximately $200 per month, for which we receive a total of 6 reports. They are: (1) total time by machine and plant maintenance by activities, (2) shop by job performed, (3) activity by shop by job class, (4) equipment record, (5) motor record, (6) completed work by job and shop.

Report No. 1

This report is a total only of hours worked in each activity by machine and plant maintenance. It is used by our cost department for allocating cost per activity.

Report No. 2

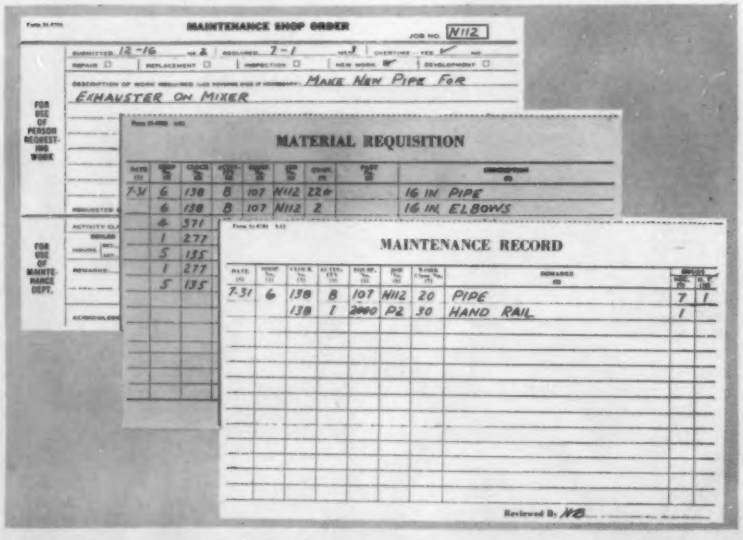
This is a total in hours of the four different job classifications performed by each shop. From this report we analyze the work loads for each shop.

Report No. 3

This report is a total of hours worked in each activity by each shop according to job classification. From this report we are able to determine what activity is requiring the highest amount of work and can readily pinpoint weak points in our equipment.

Report No. 4

A complete record by individual piece of equipment is covered in this report. It includes all work done and material used for the month. This amounts to what people using a card system would record on their equipment record cards. In addition to the monthly equipment record report we have a yearly report that summarizes



MAINTENANCE SHOP ORDER — JOB NO. N112

Submitted 12-16 — Assigned 7-1 — Overtime: Yes ✓ No

Repair ☐ Replacement ☐ Inspection ☐ New Work ✓ Development ☐

Description of work required: MAKE NEW PIPE FOR EXHAUSTER ON MIXER

FOR USE OF PERSON REQUESTING WORK

MATERIAL REQUISITION

Date	Shop	Equip.	Activity	Report	Job	Class	Part	Description
7-31	6	138	8	107	N112	22#		16 IN PIPE
	6	138	8	107	N112	2		16 IN ELBOWS
	6	571						
	1	277						
	5	135						
	1	277						
	5	135						

Requested: Activity Cl. — Order No. — Vehicle No. — Requested: — Scheduled: — Acknowledged:

FOR USE OF MAINTENANCE DEPT.

MAINTENANCE RECORD

Date	Shop	Equip.	Activity	Report	Job	Class	Remarks	Hours Reg.	Hours O.T.
7-31	6	138	8	107	N112	20	PIPE	7	1
		138	1	2000	P2	30	HAND RAIL	1	

Reviewed By: WB

Fig. 6. Three forms comprise only paper work necessary in plant. Maintenance record and material requisition are converted into punched cards and reports

the monthly reports. This is the only record that we would have to retain as a permanent record.

Report No. 5

All work done on motors is designated on the maintenance record as job P3. This information is collected and run off into a separate report so that we can record the work done on the motor record card. The reason this information has to be recorded separately is that motors are not always on the same piece of equipment.

Report No. 6.

The last report is the one covering completed jobs that have been assigned job numbers. When a job has been completed regardless of how many previous months that work was done on it, a report of total hours worked and mtaerial used is run off the month that it was completed. From the report we can tell the hours by each shop, number of regular and overtime hours worked and all material used.

Having had our system in effect two years in June, 1955, we feel that we are only beginning to realize the benefits of our program. Not having any previous records, we were somewhat at a loss in being able to evaluate our accomplishments, but now that we have completed two full years we will be able to compare our first year with out second.

Our major accomplishment has been the reduction of preventive maintenance time, thus permitting more time to do new work in addition to absorbing the maintenance of additional new equipment without additional men.

Accurate reports on individual pieces of equipment have revealed the weak points and also helped in justifying new equipment as replacements. More reasonable preventive maintenance scheduling can be worked out for each piece of equipment by reviewing the sequence of repairs, the emergency work required and material used.

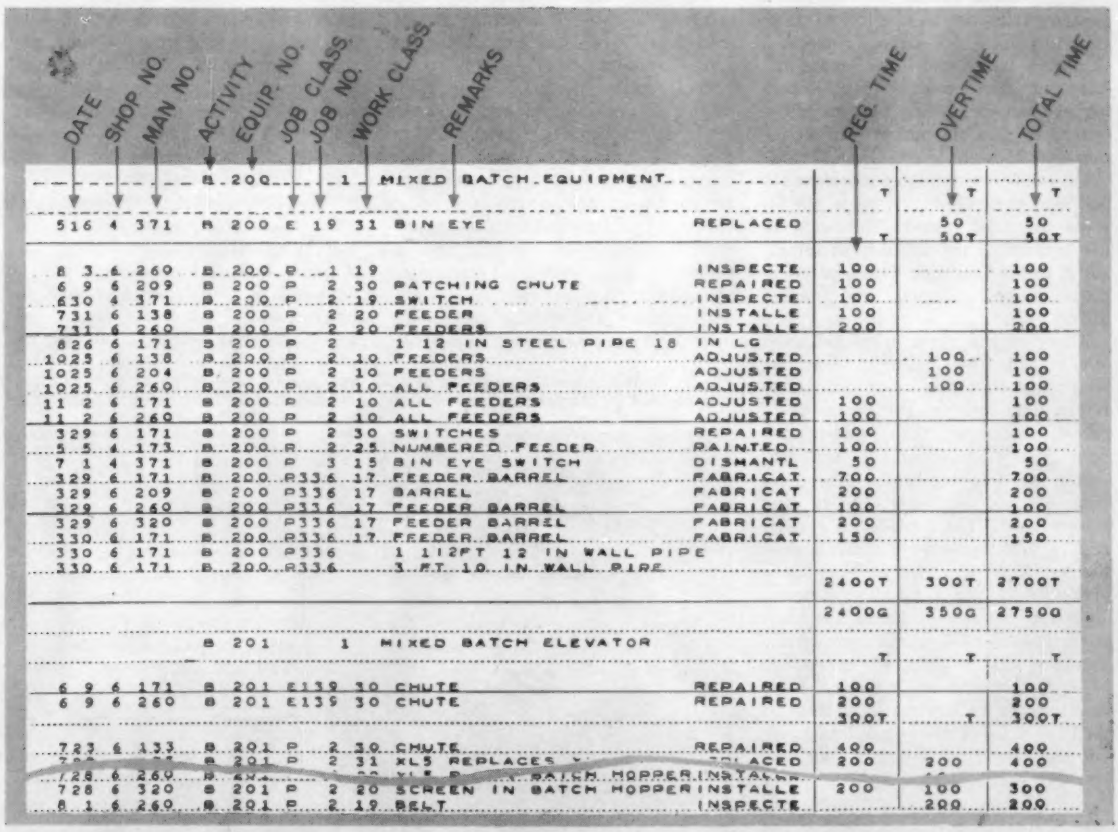
Clerical Work Eliminated

Reduction of direct labor in obtaining maintenance data for cost department reports has been obtained by using our punched card system. Prior to the adoption of this card system we obtained this information by having each man charge his hours worked to the various activities on individual cards. After these cards were filled out they had to be tabulated into total hours worked by each shop in each activity daily. These daily reports then had to be added to arrive at a monthly total. To do this job required at least one hour per day for each of the two maintenance foremen, or an average of 40 hours per month.

Since adopting the punched card system, we are able to reduce our tabulating time by at least these 40 hours per month and yet have the 6 detailed reports of our maintenance department and a total of all hours worked by activity as required by our cost department. This alone in our case would justify our system.

What we like most about a punched card system is its versatility. If any of the six reports that we are now getting does not have the information that may be required for a special report, all we have to do is call Remington Rand's Business Machine service and have this report run off. Of course, this only applies if we have the basic data punched in the cards.

The punched card system used at our plant may not completely fit into everyone's organization, but we think that a similar system can be adopted with slight modifications. It is a system that we feel gives us the most information for the least amount of labor and cost.



DATE	SHOP NO.	MAN NO.	ACTIVITY	EQUIP. NO.	JOB CLASS	JOB NO.	WORK CLASS	REMARKS		REG. TIME	OVERTIME	TOTAL TIME
			B 200			1		MIXED BATCH EQUIPMENT		T	T	T
5 16	4	371	B 200	E 19		31		BIN EYE	REPLACED		50	50
										T	50T	50T
8 3	6	260	B 200	B	1	19			INSPECTE	100		100
6 9	6	209	B 200	P	2	30		PATCHING CHUTE	REPAIRED	100		100
6 30	4	371	B 200	P	2	19		SWITCH	INSPECTE	100		100
7 31	6	138	B 200	P	2	20		FEEDER	INSTALLE	100		100
7 31	6	260	B 200	P	2	20		FEEDERS	INSTALLE	200		200
8 26	6	171	B 200	P	2			1 12 IN STEEL PIPE 18 IN LG				
10 25	6	138	B 200	P	2	10		FEEDERS	ADJUSTED		100	100
10 25	6	204	B 200	P	2	10		FEEDERS	ADJUSTED		100	100
10 25	6	260	B 200	P	2	10		ALL FEEDERS	ADJUSTED		100	100
11 2	6	171	B 200	P	2	10		ALL FEEDERS	ADJUSTED	100		100
11 2	6	260	B 200	P	2	10		ALL FEEDERS	ADJUSTED	100		100
3 29	6	171	B 200	P	2	30		SWITCHES	REPAIRED	100		100
5 5	4	173	B 200	R	2	25		NUMBERED FEEDER	PAINTED	100		100
7 1	4	371	B 200	P	3	15		BIN EYE SWITCH	DISMANTL	50		50
3 29	6	171	B 200	P336		17		FEEDER BARREL	FABRICAT	700		700
3 29	6	209	B 200	P336		17		BARREL	FABRICAT	200		200
3 29	6	260	B 200	P336		17		FEEDER BARREL	FABRICAT	100		100
3 29	6	320	B 200	P336		17		FEEDER BARREL	FABRICAT	200		200
3 30	6	171	B 200	P336		17		FEEDER BARREL	FABRICAT	150		150
3 30	6	171	B 200	P336				1 1/2FT 12 IN WALL PIPE				
3 30	6	171	B 200	P336				3 FT 10 IN WALL PIPE				
										2400T	300T	2700T
										2400G	350G	2750G
			B 201			1		MIXED BATCH ELEVATOR		T	T	T
6 9	6	171	B 201	E139		30		CHUTE	REPAIRED	100		100
6 9	6	260	B 201	E139		30		CHUTE	REPAIRED	200		200
										300T	T	300T
7 23	6	133	B 201	P	2	30		CHUTE	REPAIRED	400		400
7 28	6	138	B 201	P	2	31		XL5 REPLACES	REPLACED	200	200	400
7 28	6	260	B 201	P	2	20		SCREEN IN BATCH HOPPER	INSTALLE	200	100	300
8 1	6	260	B 201	P	2	19		BELT	INSPECTE		200	200

Fig. 7. Example of monthly reports received by Mr. Halker is this portion of Report No. 4, showing work done for the month on each piece of equipment in the plant. Column identification shows how code system translates the reports

Lubrication of Ball Bearings

Where is oil best, and where should grease be used? . . . What are the dangers of under-lubrication and over-lubrication? . . . What greases should be used where? . . . These are a few of the questions answered in this article . . . Not a detailed article, but one which charts the fundamentals for proper plant lubrication practices

By E. P. STAHL, Garlock Packing Company, Elmira, N. Y.

EVEN THOUGH BALL bearings are anti-friction bearings they are, nevertheless, subjected to sliding friction. Theoretically, sliding friction should have the least effect on power consumption. Actually, in service, it may be quite a factor as it depends upon the relative speed of the rolling points. Authorities state that sliding friction is most likely to occur between the balls and retainers in a deep groove ball bearing.

Lubrication in ball bearings can partly compensate for sliding friction although the resultant hydrodynamic pressure must not be overlooked. The friction due to hydrodynamic pressure or energy which churns or pushes the lubricant aside may be considerably higher than the rolling friction of the bearing's elements hence overlubrication should be avoided.

Oil is the most suitable lubricant for ball bearings. However, oil is not always the most practical lubricant to use because of the difficulty of retaining it in the bearings. Often practical considerations demand the use of grease.

There is the problem of retention which calls for oil-tight housings which are obviously more difficult to design than housings for grease lubrication. However, this problem has been greatly simplified and mitigated by the use of spring-loaded, unit or lip type contact synthetic rubber and leather seals. The problem of cleanliness is also made more difficult with the use of oil and this problem alone precludes the use of oil as a lubricant. Take for instance overhead line shaft boxes used in mills manufacturing fine textile or food products where spoilage or contamination is possible. It is much easier to control cleanliness if the hanger boxes are grease lubricated. Oil dripping from bearings can also create a safety hazard.

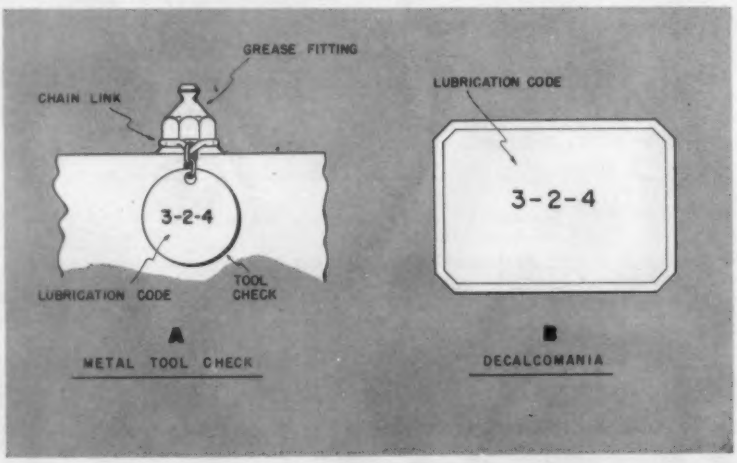
When cleaning oil-lubricated ball bearings it is better to remove the bearing caps or end covers and thoroughly clean the bearings instead of trying to purge them through oil fittings and drain plugs by means of a pressure gun.

For practical reasons more than 75 per cent of ball bearings used in industry today are grease lubricated. Physical and chemical properties of lubricating greases—such as the melting point, penetration, bleeding and evaporation, the type and percentage of soap and the physical characteristics of the oil used—will not accurately predict the performance of the grease. Nevertheless this information is of use in checking the uniformity of the grease received, and in eliminating undesirable lubricants. Calcium, potassium and aluminum soap greases are in general limited to ball bearing applications of slow speed and moderate temperatures and where frequent lubrication is permissible. Soda or soda calcium greases are usually preferred for conditions involving a wide range of speed and temperature and are employed in most ball bearing applications. However, recent experience has shown that lithium and lithium-soda soap greases will operate successfully over the temperature range now served by soda based greases and in addition they have the advantage of being water repellent.

The following characteristics are desirable for greases used to lubricate ball bearings. They should maintain smooth texture and not aerate or change materially in consistency when operated over the required speed and temperature range. They should channel sufficiently to prevent churning, but must be able to flow freely enough to provide a slight wiping action against the cage and balls, without developing excessive internal friction. Furthermore, the grease should have the ability to readily wet the bearing surfaces and should resist deterioration in storage, particularly where prelubricated bearings lie unused for long periods of time. They must also be capable of protecting the bearing surfaces from rust and corrosion under normal atmospheric conditions.

New ball bearing greases are constantly appearing on the market, and a great deal of improvement can be expected in this particular field of lubrication. High temperature, extreme pressure greases will be im-

Fig. 1. Coded numerals or decals of this type can be used to guide oilers on correct amount of lubricant, brand or type of lubricant, and frequency of lubrication



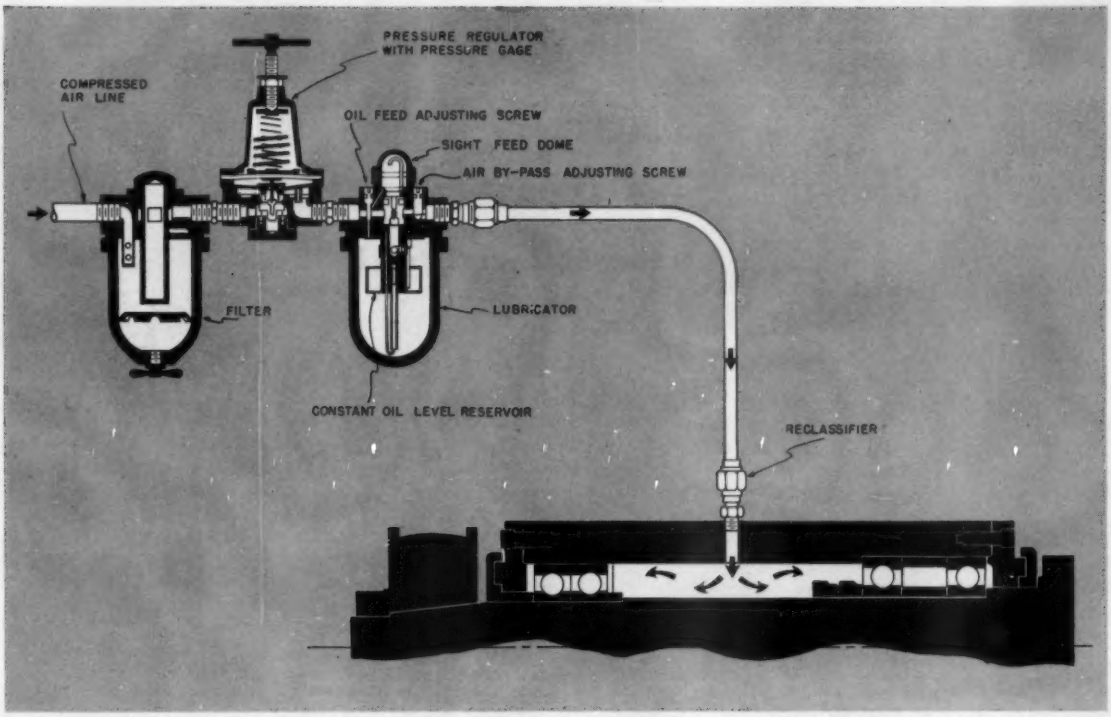


Fig. 2. Essential parts of an oil mist or fog system in which finely divided particles of oil are delivered to the bearings

proved. All purpose soap base greases for high-low temperatures and water resistance will find greater use and because of this will be improved at lower costs.

Cleaning Ball Bearings

Whenever practicable old grease should be removed from the bearing housing before adding new grease since it is the considered opinion of most bearing manufacturers that the addition of new grease does not purge the bearing of old grease—the new grease simply following the easiest path through the mounting. On the other hand, there are many ball bearing applications where it is extremely difficult, if not almost impossible, to clean the bearing housing. In such cases the only thing to do is to take the next best step, which is to add new grease to the old grease in the housing through some suitable grease fitting. Sealed ball bearings are often used in out-of-the-way places, where lubrication is apt to be overlooked or carelessly done. They are available as purchased units with built-in metal, felt or synthetic rubber seals.

A typical ball bearing housing designed for pressure grease lubrication, is equipped with a pressure relief fitting for use with a grease gun, unit or lip type synthetic rubber seals and a drain plug. Grease gun lubrication of ball bearings has always presented a serious problem on account of the possibility of overlubrication. The risk of underlubrication is obvious, but the dangers of overlubrication are even more serious, resulting in power losses, overheating caused by internal friction, excessive wear and wasting of lubricant. Without the use of a pressure relief fitting with high pressure systems, lubrication is largely a matter of guess work. To make certain the bearing has enough grease it is customary for the maintenance or shop men to "give her the gun" and trust to luck, the result invariably being a packed bearing, unless there are air pockets in the gun in which underlubrication of the bearing will result. This problem has been solved by the use of a pressure relief fitting. In this application the grease is applied close to one side of the bearing cage and makes its way through the space between the balls of the bearing. The housing in this application is so shaped as to direct even the smallest amount of fresh grease to the area of the bearing where it is most needed. A drain hole is provided to drain out old, worn out grease.

How often and how much grease should be injected into a ball bearing has always perplexed shop and maintenance men. This depends upon the size of the bearing, design of housing and conditions of operation. A properly lubricated ball bearing should be about one-third full in the bearing space.

The following may be used as a guide.

Shaft Diameter Inches	Weight of Grease to Be Added—Ounces
3/4 to 1 1/4	3/4
1 1/4 to 1 7/8	1
1 7/8 to 2 3/8	2
2 3/8 and over	3 or more

No ironclad rule can be followed regarding the frequency of lubrication. However, in extremely heavy duty service, bearings should be relubricated every two or three months. In light service the intervals may vary from six to nine months. In some other applications bearings need no attention except for yearly cleaning and relubrication when the machine is overhauled.

An important requirement of adequate ball bearing maintenance is a definite plan of regular periodic care. Such a plan should be based on the recommendations of the equipment builder or the bearing manufacturer. However, because of variations in operating conditions in different plants the actual requirements of individual ball bearings should be taken into consideration. These can be determined by noting the condition of each bearing when opened for inspection.

Some form of record system should

be established in every plant or mill to handle all machinery lubrication and bearing lubrication and a section should be devoted to the lubrication of ball bearings.

A good method to use to make sure the proper quantity of grease is applied to a ball bearing at proper intervals, is to adopt some form of identification system. One method which has been used successfully consists of attaching a metal tag, carrying code numerals, to each lubricant fitting or a decal to each bearing housing as shown in Fig. 1.

The first numeral here indicates the number of strokes of the grease gun to supply the correct amount of lubricant, the second numeral indicates the number of the brand or type of lubricants to be used and the third numeral shows the frequency of lubrication. For example, the numeral 1 indicates yearly, 2 semi-annually, 4 quarterly, 12 monthly, etc. This method of identification eliminates guesswork and makes it unnecessary for the maintenance or shop men to look up records every time relubrication of a unit is necessary.

Introduction of Lubricants

Lubricants can be introduced into ball bearings from an outside source by means of oil cups, grease cups, grease guns through a nipple or from the interior of a mechanism such as a transmission or gear box.

Figure 2 shows the application of ball bearings on a high speed machine tool lubricated by means of a centralized lubricating system in which an oil mist or fog charged with finely divided particles of oil are delivered to the bearings.

With this lubricator approximately 5 per cent of the oil flow, or one drop in each 20 passing the sight feed dome, will enter the air line and be available for lubrication. The rate of oil feed must be adjusted accordingly.

The 5 per cent of oil delivery is based upon using a light spindle oil having a viscosity—SUV 100 F—of approximately 60 seconds. Heavier oils may be used. The rate of oil delivery is slightly decreased as the viscosity of the oil increases. For example, a 1000 second oil delivers approximately 2½ per cent of the oil passing through the sight feed dome.

There are some instances when it is desirable to feed more air to the bearings for the purpose of excluding dirt from the bearings, or merely to take advantage of the additional cooling action of this increased air flow. Under these conditions, it is possible to open the air by-pass valve, partially or fully and deliver an increased amount of air to the bearings.

When it Comes to Gas Scrubbers—

Fit the Material to the Service

DURING THE PAST five to ten years a revolution has been brewing in the field of air pollution control. Individual, city, county, state and federal groups throughout the country are demanding that industry, as well as private citizens, halt the unnecessary pollution of the air we breathe.

To meet this challenge, control devices in the form of various types of mechanical, electrostatic and wet collectors have been developed. The task is monumental, not only because of the technical difficulties in corralling the often sub-micron dusts and fumes in industrial waste gases, but also because of the great variety of corrosive conditions encountered. In most industrial gas cleaning operations, corrosive contaminants are present which, unless guarded against, can spell defeat—or at best, high maintenance costs—for the project.

As a major participant in this program, Chemical Construction Corporation, a unit of American Cyanamid Company, has been perfecting the newly developed Pease-Anthony venturi gas scrubbers for control of selected air pollution problems for the last six years. In the course of this work approximately seventy-five pilot investigations were conducted in the field and over two hundred commercial installations of gas scrubbers have been made. From these installations one thing is certain. The majority of the industrial gases that contribute to air pollution contain contaminants which are rough on gas cleaning equipment. Correct material specification is all important.

Common Offender

Probably the most common offender is sulfur dioxide gas, occurring in all combustion processes where the fuel contains sulfur. When this gas contacts water, it forms a solution of sulfurous acid which will destroy ordinary steel equipment in a surprisingly short period of time. As bad as its action on ordinary steel is, sulfur dioxide is not considered a difficult corrosive to guard against. This is because there are a number of reasonably inexpensive alternate construction materials which are resistant to attack.

A few years ago a number of these gas scrubbers were installed to remove

This table shows the materials of construction, below, recommended for use with the various applications shown right	AMINE RECOVERY	LIME KILN DUST	OXY-STEEL CONVERTOR	BLAST FURNACE GAS	OPEN HEARTH FUMES	DETERGENT SPRAY DRYER	CARBIDE FURNACE	COPPERAS ROASTER	ASPHALT PLANT	BOILER FLUE GAS	SUPERPHOSPHATE DENS	SULPHURIC ACID FUMES	PHOSPHORIC ACID FUMES	HYDROCHLORIC ACID FUMES	WOOD DISTILLATION	BRASS FURNACE	SECONDARY LEAD SMELTER	ALUMINUM POT LINES	ENAMEL FRIT PLANT
MILD STEEL	●	●	●	●	●	●	●		●	●						●			
STAINLESS STEELS					●			●		●		●	●				●	●	●
COPPER															●				
RUBBER LINING								●			●	●	●	●				●	
HAVEG												●	●	●					
CHEMICAL STONEWARE								●				●							
PERMANITE												●							
WOOD								●			●	●							
ACID BRICK AND LEAD LINED STEEL								●				●							
PROTECTIVE COATING			●									●	●						
REFRACTORY LINING				●															
ALUMINITE CEMENT (GUNITE)		●								●									

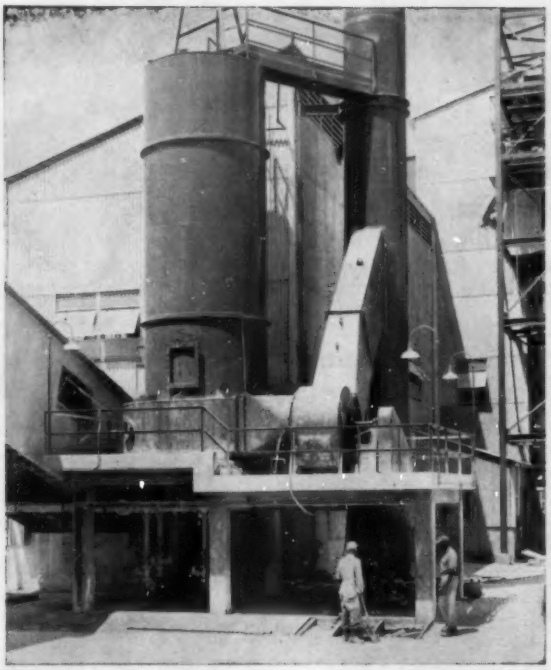


Fig. 1. This cyclonic scrubber in a fertilizer plant, is used for removing superphosphate fumes. It is rubber lined

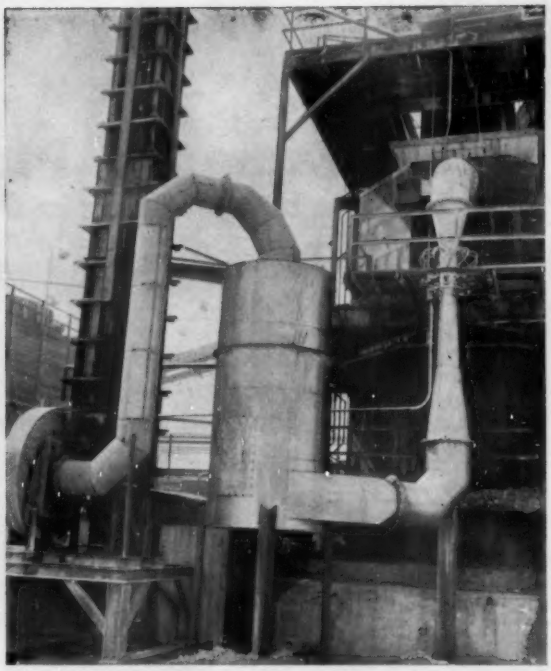


Fig. 2. This venturi scrubber installed at a chemical plant for phosphoric acid removal is made of Type 316 stainless

dust from lime kiln gases. Natural gas, containing no sulfur, was the fuel. No corrosion occurred after years of service. Shortly afterwards a unit was installed on another lime kiln where the fuel (coal) contained sulfur. The sulfurous acid formed upon contact with water corroded through the mild steel shell in a matter of weeks. An inexpensive lining of aluminite cement, gunnited in the field, offered perfect protection. All subsequent installations on kilns burning high sulfur fuel employ this same protective system.

Not quite so common, but still apt to appear in hundreds of operations requiring gas cleaning equipment, are the other inorganic acids, notably hydrochloric, nitric, sulfuric, phosphoric and hydrofluoric acids. In many cases these constituents need be present in only very small amounts to rule out the practical use of ordinary steel. In one installation, of a venturi scrubber fabricated from ordinary mild steel, no corrosion was observed after several years of operation on fumes from a reverberatory furnace. However, as a result of a change in fluxing compounds, trace amounts of hydrochloric acid were introduced into the furnace gases causing severe corrosion to the mild steel. Installation of a lead lining proved satisfactory.

Two conditions often involved in industrial gas cleaning problems complicate the materials of construction picture. One is high gas temperature. Special precautions must be taken, such as limitation of construction materials to certain metals capable of withstanding the high temperatures, or precooling (with controls or alarms) the waste gases so that low temperature materials can be used. The other condition is abrasive dust suspended in the waste gases. The latter will often preclude the use of a low cost metal which might lose its otherwise protective oxide coating due to the sand blasting effect.

Here's an Example

As an example of the various types of materials of construction which can be used, consider an installation of a scrubber made five years ago for the purpose of removing sulfuric acid fume and iron oxide dust from the exhaust gases of a copperas (ferrous sulfate) roaster. The gases leave the furnace at 800 F. Since the temperature is well above the dew point of the acid contaminant, a mild steel duct is entirely adequate to conduct the gases to the gas scrubber proper. The hot gases are cooled with a water spray in a steel chamber lined with lead and acid proof brick. After cooling, the gases are scrubbed to remove sulfuric acid mist in the venturis which are constructed of cast chemical stoneware. Next, the gases pass directly to a cyclonic scrubber constructed from 3 in. redwood staves. The internal spray nozzles are Type 316 stainless steel. The gases leave through a duct system and fan all constructed of Type 316 stainless steel. Finally, a 50 ft wood stave stack dispenses the exhaust gases to the atmosphere. The materials of construction for these installations were selected with the view to using the least costly material for each section of the scrubbing unit. The final selection has given excellent service for four years.

The engineer whose job it is to select a gas scrubber constructed of suitable materials to withstand any specific corrosive condition has a vast field from which to choose. So great in fact that it is likely that the average engineer, not specializing in this field, will be lost in the woods. With luck he may sometimes guess right. Unfortunately, the wrong selection is often made which usually leads to very costly repairs or replacement.

There is a better way to help assure proper construction for gas cleaning (or other) equipment. That is to seek the free advice and recommendations from the designers and suppliers for this type of equipment. Most of them have been in the business for years and have learned through experience. They have all at one time or another pulled boners in the selection of construction materials. The importance of this is that most of them will not repeat the same mistake. Experience makes the difference. From their mistakes you can profit.

Flood-Damaged Plant Equipment

May Prove to be a Blessing in Disguise

By J. E. LAUNDER, Jr., Independent Electric Machinery Co., Kansas City, Mo.

Author finds "bright spot" in flood . . . Damage to equipment gets it out of service for long-overdue overhaul . . . Experiences of plants in 1951 Kansas City flood area are cited as cases in point . . . The conclusion — adopt better preventive maintenance programs for industrial machinery

Fig. 1. Welding equipment was completely torn down and cleaned of mud and foreign matter deposited by the flood

Fig. 2. After being thoroughly checked and rehabilitation work performed, the parts were ready for reassembly

ACTUALLY, A FLOOD is a sort of heaven-sent heart attack for industrial plants. Just like the busy executive, who doesn't listen to his doctor's warning, suffers a heart attack, a stay in bed teaches him the real meaning of preventive maintenance. This is also true of manufacturing plants. Machinery that needs maintenance just can't be spared from the production line. Thus, the flood comes and the machine gets the attention you just couldn't get around to giving it.

Remember the motor back under the table on that planer? The table didn't seem to travel as smoothly as it used to and the thing made an awful lot of noise. You always meant to do something about it. Properly rebuilt after flood damage, the planer table travels smoothly and quietly just as it did when it was new. That long-neglected paint mixer that was in a batch when the flood hit will get a good cleaning, the gears and bearings replaced and we're back in business.

Before the 1951 flood in Kansas City we conducted our regular monthly inspection service for one of the world's largest grain elevators. Our reports told management of certain faults that needed attention. The principal ones corrected were breakdowns or near breakdowns. The flood put most of the motors and equipment out of commission, in fact, they were under several feet of water. We rehabilitated all of these motors and returned them on a first priority since the harvest was just going into elevators.

"Permanent" Flood Repairs

During the next four years, we had only a minor amount of repair business from this company. One day I had the opportunity of approaching the manager, thinking we might have done something to displease him. "You did such a good job during the flood we just don't have repair work," was his answer.

Checking the inspection reports, we found this to be true. Equipment had really had a shot in the arm. The elevator went through this harvest season, just like the last three, with no emergency trouble calls or rewinds.

At the time of the flood, our first thought was that rewinding would be the common order of the day and where would we get the winders? This was not the case. Only those motors that had had current applied when there was too much confidence that they were "just above the water," broke down in this way. Our normal complement of winders handled the job easily.

Incidentally, we smugly and secretly told ourselves that the rewinding business would be terrific in this area for years to come. One large company even established a shop based partially on this premise. Quite to the contrary,

that part of the business, as far as flood damage goes, has been terrible. Four years later, we are firmly convinced that the going over the electrical systems got was highly beneficial and that the extra breakdown-free time plants have had has done much to overcome flood losses. Also, much of this maintenance was properly chargeable to flood damage for tax purposes, which was another benefit.

While we are on the subject of money, it might be well to discuss charges. We were at a complete loss to estimate the equitable portion of this extra expense of tremendous overtime labor bills, new equipment and property devoted exclusively to this project and the maze of records that were necessarily kept. After our first dazed look at the overhead sheets, we systematically portioned the cost according to the horsepower of the motor, kilowatt capacity of the transformer, or amperage of the welder, and let each customer bear only a very minor part of the burden. We brought our customers into the discussion and came up with figures that displeased no one.

We found that no one, even in the largest companies, had had adequate experience in this type of rehabilitation work. For a while we were disorganized but finally some semblance of order came out of the chaos. When the receding flood waters allowed the maintenance crews to get at the machinery, our equipment and personnel were ready to handle the work.

As the swirling flood waters rose, one of the most repeated scenes was flashes from substations as transformers got more than their share of water and gave up. Transformers presented the biggest problem in rehabilitation. They were, of necessity, the first item most plants needed on the slow road to recovery. For replacements, we often up-rated the substation to correct an overload condition that had already existed. We scoured the country for new or rebuilt kettles of specific sizes and were highly successful in getting all types of units. Those transformers that needed only drying out, cleaning and new oil because of their size were a terrific problem. For these, two shops built special large ovens to handle them.

Incidentally, if we had to go through it again, we would suggest that some common transportation be found so that not too many trucks would be required to wait in line and create a real traffic problem. This was quite a hindrance at already confused loading docks. Portable cranes were the only solution to the handling problem, especially into and out of temporary facilities. Our customers also rented tractor or truck cranes and A-frames to help with their work.

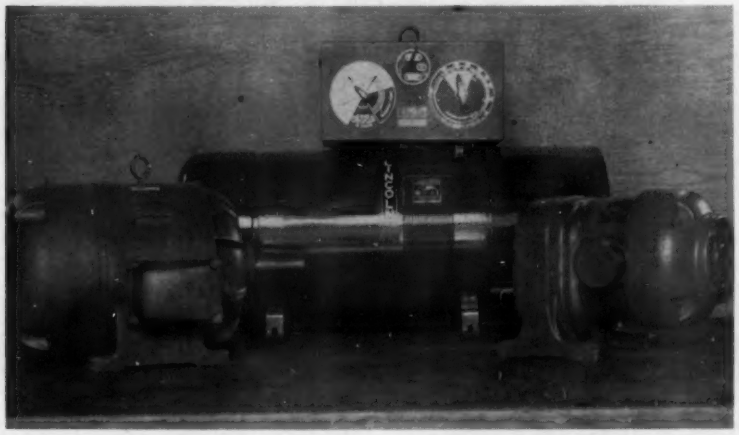


Fig. 3. Here are several pieces of equipment that have been rehabilitated in the author's repair shop and are now ready to be returned to the customers

The good old bronze bearing could in most cases be salvaged and with a good cleaning be satisfactorily put back in use. Those that were replaced were in need of attention and in this way further maintenance operations were performed. This proved to be another of the flood's benefits to plant maintenance.

Ball bearings were generally pitted by the acids that are naturally in flood waters as a result of our modern industrial operation. What acid didn't get, rust did. Just as in the case of the sleeve bearing, many bad bearings were replaced that were in need of attention even before the flood.

A great deal of mud worked its way into the insides of motors. The first operation was to wash the motors thoroughly with a low pressure water stream. Then, the more stubborn grease-mud mixture was taken off with steam. The parts, other than windings, were washed with a caustic-steam mixture, which made them much easier and quicker to do. Generally, with the exception of transformers, a 12-hour bake was enough.

Where insulation washed away, it was replaced and the motor dipped and baked while still warm from the drying bake. In many cases, it was possible to use a varnish coating for complete protection. Slot sticks, leads, terminals and other normal maintenance operations were performed. The motor was then tested and, with a fresh coat of paint, returned to the customer.

After this mass heart attack, what were the results?

The benefits of better preventive maintenance programs were obvious. Life of equipment that had been earmarked for replacement was prolonged and again good maintenance has been given a thorough testing since the flood. Old machines that men wouldn't use before, when put in good operating condition and freshly painted, took on a renewed stature in the eyes of employees. Shops and industry generally found hidden talents in their employees that enabled them to continue working on maintenance after the flood.

Don't try to do it yourself unless you have, or can build, complete facilities for cleaning, drying, baking, testing, assembly and inspection. Exercise a little patience and take a few days longer to go back into operation. If possible send your work to the shop that has been doing your maintenance work regularly. They want to help you and keep you as their regular customer.

After reading this account of the experience of others, we hope you will take a new lease on life and hope for the future. What may appear to be a calamity may well turn out to be a real tonic. We feel sure you will find that you are not really in as bad shape or as terrifically hurt as it first appeared you were.

How Aluminum Can Serve Industry

By R. L. HORST, Aluminum Company of America

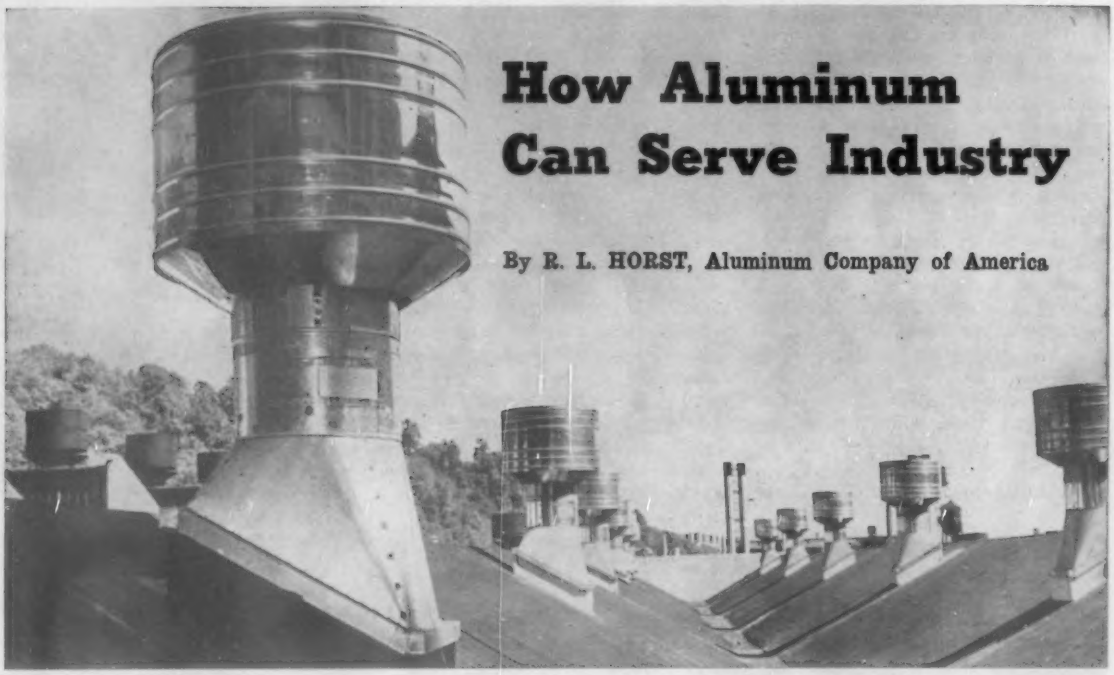


Fig. 1. Unpainted aluminum ventilators provide high resistance to corrosion from industrial, marine environment

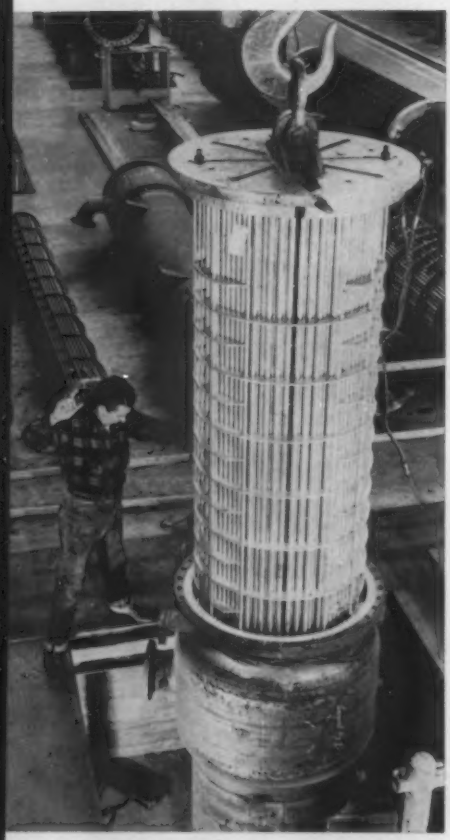


Fig. 2. This aluminum heat exchanger tube bundle is headed for a refinery

DETERMINING what material will best handle a troublesome industrial operation is usually based on economy, in addition to other factors. If choice is based primarily on economy, it is advisable to also consider the maintenance costs in addition to the first cost.

Such factors as ease of fabrication, high resistance to corrosion and nonsparking also may be important for the applications contemplated.

In many cases, information on the materials you have selected may be available from the manufacturer or the distributor. In other cases, such data may not be known and testing under service conditions is required.

To facilitate this job many companies have organized corrosion engineering departments to cooperate with plant engineers. Thus, the tools that are available to plant engineers for aid in selecting materials include:

1. Past experience of their own company or that of the suppliers.

2. Research and development facilities of their own company or of the suppliers.

One material that meets the factors listed above and a number of others besides is aluminum. In addition to its resistance to attack by a wide variety of chemicals, it offers such other advantages of light weight, with its effect on cost of the equipment; high thermal conductivity; and reflectivity of radiant energy. Its compounds are colorless, which influences its choice for equipment in the textile and varnish industries. It is being used in a number of industrial applications, several of which are mentioned below.

Aluminum ductwork, in alloys 1100, 3003, 3004, is used in a wide variety of plants and buildings. While it may be more expensive than other metals, it requires little maintenance and has high resistance to corrosion by many vapors, fumes and dusts.

This natural resistance of aluminum to corrosion by water, hydrogen sulfide, ammonia, carbon dioxide and a number of inorganic and organic compounds makes it an ideal material for heat exchanger tubes.

Aluminum Alloys

Tubes of aluminum alloys are normally recommended where water is the coolant. Because aluminum alloys may be used with many chemicals without causing discoloration or harmful contamination, they are often used with products where water-whiteness is required.

Roofing and sidings are other applications where aluminum has proven effective. Roofs of 0.032 in. aluminum are still in good condition after exposure to chemical environments for more than 20 years. In such applications, aluminum offers such advantages as fast erection, low maintenance, light dead loads, high resistance to corrosion and high heat reflectivity.

Schedule 40 pipe is recommended for pipe and fittings used to carry fluids in chemical, petrochemical and food processing plants. Because aluminum does not catalyze the decomposition of many sensitive chemicals, it is desirable for food processing plants.

Tubing, made of aluminum, is being used for instrument air lines, steam tracers, hydraulic lines, lubricating lines and also in refrigerators. This tubing is available in lengths up to 1,000 ft and offers such advantages as good bursting strength and good mechanical properties at low temperatures. In addition, it will not cause the formation of sludge or gum and does not discolor the fluid it carries.

Other Uses of Aluminum

Industry is finding many uses for the recently introduced steam-traced pipe, Unitrace, which eliminates the cost of external steam jackets or steam tracer tubes since the steam line is an integral part of the aluminum pipe.

This pipe is recommended for handling naval stores, molten sulfur, ammonium nitrate solutions, glacial acetic acid, fatty acids, tar, pitch, and similar products normally requiring steam-tracing.

It lends itself readily to shop fabrication and can be formed easily with ordinary pipe-bending tools. It is available in 2 in. pipe size. Preformed thermal insulation will fit the pipe, but improved efficiency makes insulation unnecessary in many cases.

Aluminum is being used in greater amounts in electrical systems. Aluminum conduit, with its resistance to many industrial atmospheres in addition to appearance and the fact that it does not require painting, is preferred by food and beverage plants. For large size cables, the non-magnetic characteristics of aluminum conduits result in a lower voltage drop along the cable.

Many cooling towers now in service are constructed of Alclad 3003 and Alclad 3004 sheet for sides and bottom with redwood fill and alloy 6061-T6 for structurals. Both treated and untreated waters are handled. In many cases, aluminum cooling towers are installed on the roofs of existing buildings because of their light weight.

High strength aluminum alloys, available for structural purposes, provide a light, strong corrosion-resistant structure that is especially advantageous for portable structures or chemical plant applications. Other areas where this product is also being used is in weatherproofing, tanks, grilles and gratings, wiring, bus bars, and shipping containers.

Fig. 3. Aluminum alloy rafters, girders and eave angles have been installed on the steel shell and column framework of this petroleum storage tank

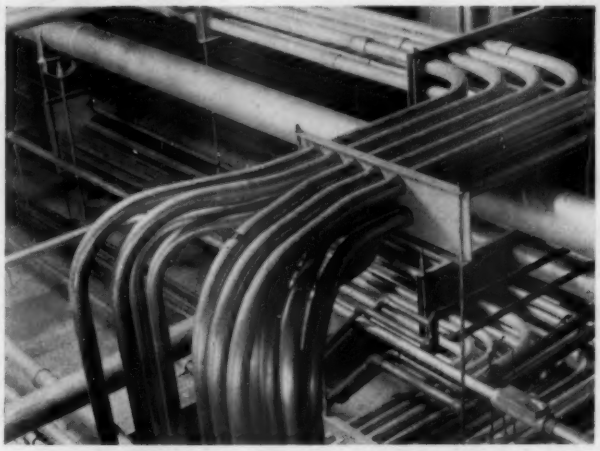


Fig. 4. Conduit made of aluminum is being used in many plants, especially food and beverage, where corrosive conditions exist

Fig. 5. Many cooling towers now in service are constructed of aluminum sides and bottom with redwood fill and alloy 6061-T6 for the structural members

Fig. 1. Centrally-located control panel holds "brains" of the $100,000 cleaning-phosphatizing-painting system at Detroit Steel Products. Operator pushes buttons to route carriers through the various operations

Electronics Control Painting

New System Governs Parts Flow at Detroit Steel Products

ON A CENTRALLY-LOCATED station surrounded by cleaning and phosphatizing tanks, dip paint tanks, and drying and baking tunnels, the electronic "brains" of a $100,000 painting system keep dozens of conveyorized carriers moving through dissimilar operations.

This new system, in operation at Detroit Steel Products, Erie, Pa., removed a plant bottleneck partially caused when outmoded equipment was overloaded by a government mine contract, being processed in addition to regular window production.

Nearly automatic, the "brains" of the system have to be set by an operator who knows routing of parts. Various combinations of "flags" on individual carriers tell the operator what selector switches and indicating lights to energize, and then air, hydraulic and electric power take over. These, in turn, move carriers by chain conveyors, operating at different levels, criss-crossing and channeling loads automatically to the proper cleaning and subsequent operations.

The electronic system incorporates dozens of limit switches, contactors, relays and timers. A carrier may have three "flags" which hit limit switches along the conveyor route to set up subsequent operations. "Flags" are merely metal strips set 1½ in., 2¼ in. and 3 in. above the carrier top, and staggered so that they will touch limit switches.

For instance, the worker on floor level loads a carrier with surrounds and puts a "flag" in number three position. This means the surrounds will travel through cleaning and phosphatizing tanks, be dried, be dipped in a paint tank, baked dry, and when the carrier descends to floor level again be routed to the particular assembly or storage area where needed.

Another carrier will have nine parts which must skip the paint tanks. "Flags" might be set at numbers two and one, to accomplish just cleaning, phosphatizing and drying.

Pneumatic power loads and unloads the main conveyor system, and operates switches routing carrriers.

Fig. 2. Close-up of carrier, one-ton capacity, being lowered hydraulically by bridge crane into one of the phosphatizing tanks for a 1½ minute interval

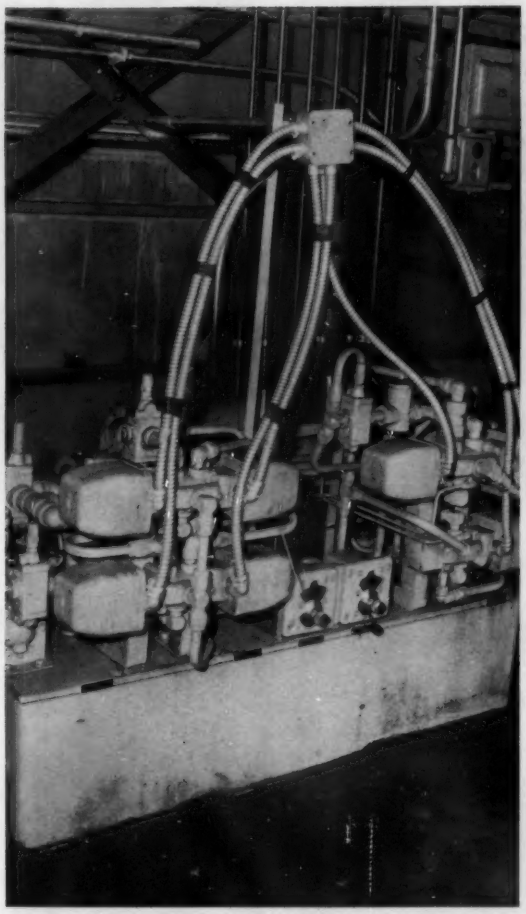


Fig. 3. Hydraulic power, through cam-operated valves, gives slow acceleration and deceleration to varied loads

Fig. 4. Carriers descending from bake oven have "flags" which hit these limit switches, directing load to correct floor level

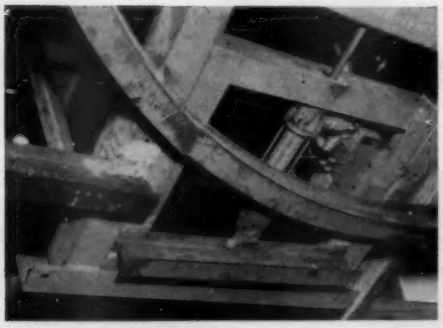


Fig. 5. Pneumatic unit moves curved or straight rail into place, when carrier flag hits switch

Fig. 6. Coming out of high level baking oven, far right, turning and descending, are surrounds on carriers. Mine parts, lower right, have been through the limit switch routing, Figs. 4 and 5, are ready to be pushed to next station

Fig. 1. This workbench is the result of a study made to reduce the electricians' walk time to and from the job to get necessary tools and materials. A list of equipment kept in these workbenches appears on the opposite page

Maintenance Problems—

How to Study Them, Get the Facts and Find the Solution

By D. W. KARGER, Chief Plant and Industrial Engineer, The Magnavox Co., Fort Wayne, Indiana

Here is the Problem Under Discussion

Basic Problem:	Walk time of electricians to get tools and materials limited on-the-job work time
Reasons for Walking:	
Major:	Small stock items such as machine screws, washers, nuts, conduit fittings, conduit nipples, junction boxes, wire, lugs, fuse links, solder, solder flux, etc.
Minor:	Miscellaneous tools such as electric drills, drill bits, solder iron, conduit threader, vises, workbench facility, conduit hickey, fish tape, etc.

DO YOU WANT a solution to a typical electrical maintenance problem—one that will add productive man-hours to your electrical group—a solution that probably will improve your situation, even though you've already found the problem and worked on it?

This article will attempt to illustrate how a practical engineering technique has been applied to a typical maintenance department problem. Not only is the problem-solving technique—admittedly an old one—outlined, but the step by step analysis can be applied to numerous problems in your plant.

Solution: Bring These Tools to the Job

Here is a list of the tools and necessary supplies contained in each workbench. There will be a slight variation for some of the workbenches depending on the tasks and areas normally covered by the electrician.

Oil can, 100 ft fish tape, ¼ in. motor drill and drill bits, one set of Toledo pipe dies and stock ½ in. to 1¼ in., marker outfit numbers 1 through 9 (circuit numbers), test light, hack saw, 12 in. crescent wrench, plumb bob, conduit bender, 6 ft rule, leather belt and pocket containing miscellaneous hand tools, such as side cutters, fuse puller, rule, tapes, etc.

One set socket wrenches, small propane torch, electric soldering iron, one pipe reamer, spool of solder and paste, Stakon terminal kit, knock out punch set ½ in. to 1¼ in., two 14 in. pipe wrenches, machinist's hammer, assorted bastard files, machinist's vise, pipe vise, solder ladle.

Friction tape, number 33 Scotch tape, cambric tape, flat plastic box of miscellaneous ¼ in. by 20 R.H. stove bolts ½ in. to 1½ in. with nuts and washers, conduit reducers ¾ in. to ½ in., 1 in. to ½ in., 1 in. to ¾ in., close nipples, lock nuts and bushings ½ in. to 1¼ in., hole closers, Ackerman-Johnson lead shields, insulated staples, telephone wire hooks, conduit couplings ½ in. to 1¼ in., straight nipples ½ in. to 1¼ in.. offset nipples ½ in. and ¾ in., solderless lugs, split bolt connectors, toggle bolts $\frac{3}{16}$ in. by 3 in., ¼ in. by 4 in., sheet metal screws #10 by 2 in.

Lag screws ¼ in. by 1 in., outlets (double plug) 4 wire and double pole, assorted fuses and links, duplex outlets #1748, porcelain sockets #1706, cord body connectors, lavaliere switches, double pole bench switches, Greenfield fittings ⅜ in. by ½ in., Minerallac clamps #0 to 3, beam clamps ¼ in., pipe straps ½ in. to 1 in., screw-in plugs, cube taps, plug caps, two wire bell cords for buzzer.

Single pole switches, conduit covers, handy box covers, conduits ½ in., tees ½ in., LB's ½ in., ¾ in., 1 in., C's and tees ½ in., square covers 4 in., combination duplex covers, unions 1 in., four ctn (2000 ft) #12 wire, four ctn (2000 ft) #14 wire, ⅜ in. Greenfield 10 ft, ½ in. Greenfield 10 ft, 4 in. square boxes, 4 in. octagonal boxes, handy boxes and shop cloths.

Conduit is not included in this material list. This is transported to the job site in a special truck or it may be carried, depending on the amount required. A portable power threader is also available for the larger jobs.

Step 1. Isolate and Define the Problem

Before any problem can be solved, it must be defined.

A word of caution—don't try to pick on too broad a problem, particularly on your first few attempts to use this tool. This is a common cause for failure.

In our plant a lot of walk time was seriously limiting actual on-the-job work time for our electricians.

The original observations were on a casual basis and were found to be adequate for isolating a problem requiring solution. A more scientific and usually better approach, for studying this type of situation, is to conduct a Ratio Delay Study. We later conducted such a study to find out more accurately just how much walk time was occurring.

The practical result of the observation and the subsequent Ratio Delay Study was that we now had a problem on which to work. True, we did not know whether or not it was amenable to a practical solution. Further study was now needed to develop a satisfactory answer to this question.

Step 2. Be Sure to Get all the Facts

Once the problem was isolated, we had to find out all of the details concerning the problem.

Getting the details in this case involved simple and practical questioning of the supervisors and the workers, in addition to personal observation by the individual conducting the analysis.

Obviously, we had to find out the various reasons for the walking, in addition to the origination points and the destinations.

Other fact-finding techniques may be required for other types of problems. Regardless of the technique used, your bible should be the five questions: 1. What? 2. When? 3. Why? 4. Where? and 5. How?

Answers to our questions soon disclosed that most of the walking was caused by the need of supplies and the two terminal points of the walks were the site of the work and the maintenance stock room. These additional trips cut into the electricians' time servicing equipment.

While this information was interesting, it still was not enough to work out a practical solution which would eliminate most of the walking. Obviously we could not bring the entire stock room to the site of each job.

Further study made it obvious that if we wanted to eliminate the need for walking by the electricians, we would have to determine what kind of material was being sought most often. We thought that it might be possible to have at least certain kinds of material available at the site of work and thereby eliminate a good portion of the walking time.

This consideration and problem solving interpretation of partial facts to determine additional fact-finding requirements is usual in any endeavor. It is a practical way to limit the fact-finding phase to essentials and can save many unnecessary man-hours.

Continuing investigation of the problem turned up the fact that most of the trips were caused by the need for common conduit fittings, nipples, screws, nuts, washers, fuse links and similar small miscellaneous items. Part of this information was obtained by a review of usage data on the stock cards.

The fact that this material normally did not require a great deal of space, plus the fact that its monetary value was normally low in comparison with other material charged out of the stockroom and used by the electricians, made us hopeful of being able to provide a means for having it on the job site.

Investigation disclosed a secondary reason for the walking. This was found to be caused by a lack of tools and common work facilities on the job site. These tools involved electric drills, pipe cutting and threading devices, work bench facilities, including vises, and certain kinds of common hand tools.

Before going on to the next step, that of developing the solution, it is well to summarize all of the data and restate the problem. This procedure will often clarify the situation and make the solution more obvious. It also tends to reduce the chance of forgetting about important aspects of the problem that might be overlooked.

Some problems can best be summarized in flow chart form, while others can adequately be recapped by means of brief statements. In this particular problem we followed the latter procedure and merely stated the various facts concerning the problem. This recap or summary is illustrated at the beginning of this article.

(Please turn page)

Step 3. Now, You Can Solve the Problem

Now that the facts were known, the next step was to solve the problem. The basic questions to test the facts and help to develop solutions in any methods analysis are: 1. Can we eliminate? 2. Can we combine and thereby simplify? or 3. Can we simplify?

In almost any endeavor such as encountered in Step 2—Getting the Facts—and Step 3—Finding the Solution—the two tend to merge, at least in part, as approaches are developed to the solution and the facts are being secured. In addition, the need for additional data is often disclosed as part of the problem-solving phase.

A brief study and reflection concerning what has happened in the particular problem outlined, discloses that both of these actions did occur.

Examination of the facts concerning the problem made it rather obvious that certain stock materials, tools and work facilities needed to be transported to each job site. A better method of doing this was needed!

Doing this also meant that the items had to be carried in a unit of high mobility—a unit that could preferably be handled by each electrician or electrician and helper. (If a journeyman has a helper, one truck serves both of them.)

Solution: Portable Work Bench

We, therefore, set about designing a portable work facility which would provide storage room for tools and stock materials. Before finally arriving at a unit which was deemed satisfactory, we actually tried out several versions of the required facility. All units were built in our maintenance shop.

The final unit is illustrated in Fig. 1. It is a cabinet of sheet metal construction having a heavy gage top which can be used in place of a workbench. Mounted on one end of the cabinet is a pipe vise and on the other a common machinist's vise. Mobility was provided by means of the two fixed wheels plus two pivoting wheels. A caster brake was installed to effect stability once the work location was reached.

Drawers provide space for the commonly required small supply items and space to store the smaller hand tools. They contain compartments of various sizes for efficient storage of the many parts needed by the electricians. Heavy tools are stored in the space underneath the drawers. The approximate construction cost of this unit is $200.00.

Walk time was reduced about 20 per cent, which amounted to approximately 400 manhours per man per year. It is obvious that the endeavor was worthwhile.

The problem finding and solving procedure illustrated shows how one particular problem was solved. Other problems can be isolated and solved in a like manner.

Big Squirt Cuts Metal

Chemical Slices Through Hard-to-Reach Pipe

CUTTING PIPE in an out-of-the-way place is always a laborious job. However, that job will be easier now, thanks to this chemical cutting tool.

It is already being used successfully in the oil industry and offers numerous possibilities for other industrial applications.

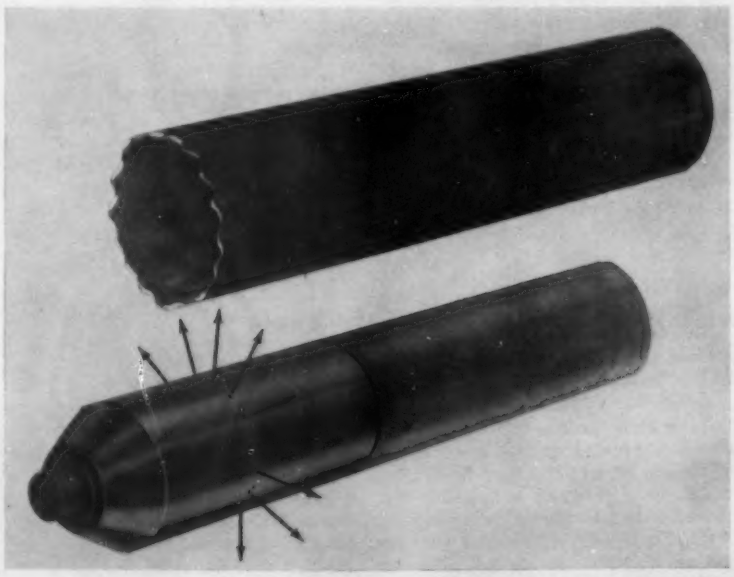
This new chemical cutter, developed by McCullough Tool Co., Houston, and Pennsylvania Salt Mfg. Co., Philadelphia, is said to be more efficient than an explosive charge and faster than a mechanical cutter.

Mystery Chemical

The chemical is contained in a heavy-walled cylinder equipped with a pressurizing chamber and a firing head with appropriately spaced orifices. The companies will not say exactly what is in this compound, except that it contains bromine and fluorine. to point out that it contains bromine and fluorine.

In its application in the oil industry, the assembly is lowered into the oil well where it is positioned accurately and held against powerful thrusts by specially designed latches. Upon electrical impulse through an electronic panel and conductor cable, the chemical is ejected under enormous pressure against the inner wall, which it penetrates in a fraction of a second.

By changing the placing of the openings, the tool makes a clean cut, with none of the objectionable flaring produced by previously used explosive methods.



Top illustration shows a section of 2 in. tubing cut by the chemical cutter. The chemical is ejected under great pressure from openings in the cylinder head

How to Care for Your Floors

THERE IS A right and a wrong way to take care of floors. With this in mind, one manufacturer prepared a booklet on what steps should be taken to care properly for your floors.

This 22-page illustrated booklet "How to Care for Your Floors," discusses long-range and day-to-day maintenance programs for all types of floors. The "How to" treatment is employed throughout the book to explain how the different floors should be maintained.

Several examples of the various subjects covered appear on this page. A variety of floors and their care are discussed, such as: terrazzo, marble and ceramic tile, wood, cork, vinyl, concrete or magnesite, linoleum, rubber and asphalt tile. One page is devoted to a number of floor care "don'ts" and several others tell how to cure sick floors, how to maintain floor safety and how to choose floor cleaning supplies.

There is also a section on suggested treatments for some of the most common floor failures, such as loose tiles, yellowing, lack of water resistance, tackiness, booming, cracking, curling, cupping and pitting.

Want a Copy?

If you would like to have a copy of this booklet, either write The Editor, Plant Engineering, 110 South Dearborn St., Chicago 3, Illinois, or indicate "Floor Care" on the bottom of the postage-paid cards in this issue, and we will forward your request.

HOW TO CARE FOR
terrazzo marble ceramic tile
PREPARATION AND FINISHING
HOW TO CARE FOR
concrete or magnesite
PREPARATION AND FINISHING
HOW TO CARE FOR
linoleum
How to MAINTAIN FLOOR SAFETY
Always keep floors clean and properly finished!
That's the easy-to-follow rule for safe-as-possible floors.
Are your floors ailing?
Here's HOW TO CURE SICK FLOORS!

Plastics Problems Pester Plant Engineers

A Plant Engineering Reader Survey

Photo: Rohm & Haas

Skylights with domes formed from large single sheets of acrylic plastic. It took 585 domes for this Signal Corps building

IT WOULD SEEM, from the results of a recent questionnaire to one thousand of PLANT ENGINEERING's readers, that neither we (speaking of industrial publications as a whole) nor the manufacturers of plastics have done the best possible educational job on the industrial uses of plastics.

With a return, on this 3-page questionnaire, of approximately 29 per cent, a surprisingly large minority of the respondents indicated complete ignorance of the value of the various types of plastics for use somewhere in industrial plant's structure.

Some of these plant engineers, it is true, showed a remarkable lack of energy in acquiring any knowledge on the subject and a few indicated no interest in the subject, even if plastics could have solved *all* of their problems.

Question 1. "Where in your plants' structure or utilities do you now use plastics?"

The most widespread application of plastics, as indicated by the questionnaire, was in piping which was marked by 97 of the nearly 300 respondents. Trailing by a nose was the use of plastics for windows and this was followed closely for third spot by plastic skylights. Therefore, glazing on the whole with a total of 144 mentions for both windows and skylights was the leader.

Forty-five indicated that they use plastic valves; while the use of plastic for flooring and tanks was tied with 38 mentions each.

There was a great variety of other uses for plastics which were written in on the questionnaire. These ranged all the way from protection shields near acid valves, through sand chutes, to duct work covering, and curtain walls around covered storage areas.

Leading the list of these "other" uses was the mention of the use of plastics for machine guards; this was written in on 9 questionnaires. Other uses mentioned were for panels in doors, for pump castings, for truck wheel fairings, for sight glasses, pipe coverings, bearings, and as windows for the inspection of internal conditions of filters.

Question 2. "Do you use plastic materials for replacing broken windows?"

This application seemed to be the one which was understood best by the greatest number of respondents. Seventy-six indicated that they did use materials in this manner while 200 stated that they did not. A sub-question, "If the answer is yes, what type of plastic do you use?", probably was not stated clearly enough inasmuch as both proprietary terms and generic terms were used. Plexiglas was mentioned by 22 respondents, Resolite and Corrulux tied with 8 mentions each; while Lucite came in third with 6 mentions; and Alsynite was mentioned twice. One respondent said he used "opaque" material; four said they used "clear." Other mentions included "Fiberglas reinforced" 5; Vinyl 1; Methyl Methacrylate 1; Polyester 1; and Polyethelyne 1.

Still a second sub-question of question No. 2, "If you do not use plastic materials for replacing broken windows, please state the reason" was quite revealing. Three respondents had excellent reasons for not using plastics to replace broken windows; one of them had no broken windows, while two of them had no windows. Some of the typical reasons for not using plastics were as follows: "No experience;" "Have never considered the use

of plastics;" "Not aware that it was a suitable replacement for glass;" "Use of plastic had never occurred to us;" "Hadn't thought of it;" "Value of plastic as a substitute for glass had not been demonstrated to us;" "We have not been sold on it."

Still another indicated that they "had no information nor source of supply." And again, "never gave any thought to its use." All of these would indicate either a failure on the part of industrial publications and/or manufacturers of plastics in bringing home to all plant engineers the valuable characteristics of plastics where these characteristics can best pay off.

On the other hand, glass is certainly far from being endangered as the leading glazing material as witnessed by such statements as "Change would not be economical;" "Use of plastic would require costly alterations;" "We use glass to match our existing windows;" "We experience difficulty in preventing scratching of plastic glazing."

Several respondents complained about the high first cost of plastic while others indicated that use of plastics was prevented by present fire codes particularly in Detroit and New York. (This condition may be changed by the recently introduced fire resistant plastic glazing now being marketed by several firms.)

Other comments which indicated that glass was still the front runner were: "Glass available and also cheaper;" "We consider glass better at least with present available plastics." Still another reader states: "We must use safety glass;" and another complained that "Appearance of plastic is poor and the cost is too great." One reader, in a chemical plant apparently, stated that the "Higher initial cost of plastic plus deterioration of surface by air borne contaminants makes plastics undesirable."

Why It's Not Used

To sum it up, 25 stated they were not using plastic because of the high cost factor; 8 stated that fire hazards involved in the use of plastics had been a deciding factor in the choice of glass. Lack of experience in the use of plastics, and the fact that its use had never occurred to them was mentioned by 23 respondents. The physical characteristics of the plastics to which many of them had been accustomed was the deterrent factor in many cases as indicated by such statements as: "Don't like its looks;" "Sun discolors it;" "It crazes;" "It's attacked by fumes." Reasons such as these were mentioned a dozen times. On the other hand, there were many respondents who indicated that the use of plastics was now under investigation and would probably be introduced as part of their construction standards in the near future.

Several respondents, however, complained that sufficient basic data on plastics had not been made readily available. These feelings were pretty well summed up in one reply by the statement:

"The cost of these plastics is prohibitive and there is insufficient data on its durability, resistance to fire, vibration, building expansion, weathering, temperature variations and other physical and chemical properties."

Question 3. "Are you contemplating the use of either flat or corrugated panels for maintenance work of any kind?"

Forty-three respondents answered "yes" to this question while 112 said "no." Answers to the sub-question, "If you are contemplating such use please state the reason," indicated that usages for flat or corrugated panels were not confined, by any means, to glazing. Among the uses to which this material would soon be put were for toilet stall partitions, sight glass panels, as windows in crane cabs, and to withstand corrosive conditions. Reasons given by one respondent for the use of this material: "Corrugated panels have less chance of leaking, are easy to install and there is no breakage," more or less summed up the reasons given by at least one half of the respondents to this portion of the question.

Question 4. "Which property or properties of translucent reinforced plastic sheets is most important to you?"

To this question 141 respondents answered that the shatterproof quality of plastics was of prime consideration to them; corrosion resistance, checked by 99 respondents was second, while "highest possible light transmission" checked by 96, was the third most important property. Following in order of importance—at least in the minds

Attention Manufacturers

Quoted below are some of the suggestions and complaints made by respondents. Many of them voice problems that can be solved; others will have to wait for new advances in the field of plastics; all of them express widespread needs for basic data by plant engineers in industry today.

"Concrete, practical, how-to-do-it information on applications of plastics to buildings and processes either is not available or has not been promoted to the plant engineering, construction and maintenance field."

"We are neither chemists nor chemical engineers. The vast array of plastics (usually referred to by such terms as non-plasticized or polystyrene or cellulose butyrate; or by trade names such as Kel-F or Boltaron or Corrulux) creates confusion in the minds of the industrial man who wants to apply these products in his plant. Is there no method by which these materials could each be referred to in advertising by a common generic name? Also, could not the manufacturers get together on an application manual showing where and how to apply the various types of plastics to meet various conditions? This would do much to increase the use of plastics as part of the industrial plant buildings and industrial process equipment. I am not speaking of the products made by the plant."

"Piping and fittings should be standardized by all suppliers, as is metallic pipe and fittings, so that competitive bids would be easier to obtain."

"Our use of plastics has been adversely affected because of lack of knowledge of the properties of the various types available. We can't get information on its strength, wear resistance, heat resistance or methods of bonding."

"Many manufacturers make lurid claims in advertising and in bulletins. When we ask for answers to our specific problems they start to hedge. They tell us all about other problems they have solved. I am interested only in mine."

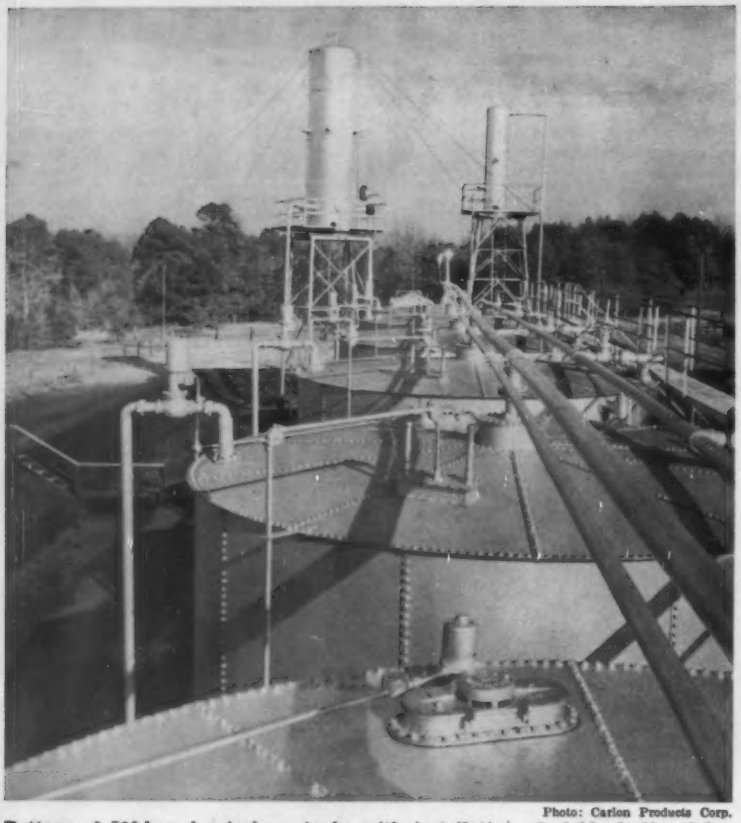


Photo: Carlon Products Corp.
Battery of 500-barrel petroleum tanks with installation of rigid plastic piping

of the men who participated in the questionnaire — were, fourth — "flame resistance"; fifth, "least possible amount of glare"; sixth, "light weight"; and seventh, "color stability."

Question 5. "If you have used any of the products named below—made of plastics — please indicate how these plastic products have compared with similar products made of conventional materials."

This section of the questionnaire included comparative questions on glazing, piping, valves, duct work, tanks and stacks in which the respondents were asked to check under each of these categories where plastic materials had proved to be better than, equal to, or poorer than conventional materials usually used in these services.

Under "glazing," 48 indicated that plastic glazing was better than, 17 said it was equal to, while 11 said it was poorer than materials generally used in their plants for this purpose.

Under "piping," 56 said plastic piping was better than, 23 said it was equal to, and 17 said it was poorer than materials formerly used for this service.

In the use of plastic valves, 24 said they were better than, 6 said they were equal to while 7 indicated that plastic valves were poorer than valves made of previously used materials. There was no indication of the types of service valves were used in.

Plastic ductwork showed the greatest majority in its favor. Here, 19 stated that it was better than, 3 said it was equal to while only 1 said it was poorer than other types of ductwork formerly used.

Plastic Tanks

Plastic tanks, too, held quite a lead over rival materials. Twenty-five respondents said plastic was better than, 9 said it was equal to, while only 3 said it was poorer than previously used materials.

While not many respondents had any experience with plastic stacks, 6 thought they were better than, 3 equal to and 1 poorer than materials formerly used.

Some of the comments under this category were "Plastic tanks better than stainless but plastic piping poorer than glass piping." "We use plastic piping in some of our research units to study flow of liquids and gases."

Question 6. "What maintenance or construction problems have you had which are not currently being solved satisfactorily by any conventional material?"

The multiplicity of problems stated by the respondents to this question was so great and so varied that it would be impossible to tabulate them. There are, however, a few which had common denominators such as: eight mentioned rust and corrosion of their greatest problem; six mentioned breakage; three had trouble with erosion; and two were faced with the problem of replacing water lines in old buildings.

Wanted: Plastic Curtain

Among the more specific problems was one from a reader who complained that he practically had his problem solved if a salesman hadn't run out on him. This reader formerly used canvas drop curtains in dry kilns wherein they were subjected to temperatures of 130 F in a humid atmosphere laden with tannic acid. This reader stated that, "A salesman called on our plant about 2½ years ago and left a sample of plastic material for us to hang in the kiln to see if it would stand up under the severe conditions. This sample was exposed to these conditions and showed no signs of deterioration after eleven months. Canvas curtains are destroyed in from 6 to 10 months. We tried to locate a salesman, or the company he represented, but we failed to do so."

Another reader stated that he was faced with no problems at the present time but "soon we must install some piping for mercury vapors. Is there a plastic that will resist the vapor from a mercury reduction retort? Also, how about the plastic's ability to stand up under the job of dissipating heat to the atmosphere with a vapor temperature of 600 F and ambient air temperature of 100 F?"

Several readers had problems which should, on the surface, lend themselves readily to solution with several of the presently-existing plastic materials. Among these, of course, are the six mentioned in the first paragraph under Question 6—those who were having trouble with breakage. Another respondent is having trouble with molding sand sticking to the metal surfaces of steel and plaster dies in the forming of roofing tile. Unfortunately, this reader requested help but did not give his name or address. We say "unfortunately" because from the statement made by this respondent, he should have little trouble if he uses: 1. One of the several mold-releasing agents such as a silicone, or 2. Either thin teflon sheets fastened to the mold or a coating of presently-available teflon paint.

Among some of the more prosaic problems faced by respondents—but problems as vexing as the more exotic—were high condensation on windows; plating room piping; material which will permit construction of inter-office partitions but still let light and air pass through; piping and tank coatings; a non-stick coating material for hot candy slabs (here, also, teflon should be able to solve this man's problems); maintenance and abrasion resistance to parts of shot blast and peening equipment (nylon might be of assistance here).

Material problems did not make up the entire batch of respondents' problems. Techniques in the handling, fabrication and maintenance of plastics were also causing trouble. For example, one man stated that "Our sheet metal people are not familiar with the use of plastic ductwork." Still another stated that joining of plastic was one of their greater problems and ended up with the plaintive note, "Probably poor technique on our part."

Question 7. "What properties would be necessary in a material which could

Some Sources of Data on Plastics

Plastics Materials—Basic Producers

Bakelite Company
30 East 42nd St.
New York 17, N. Y.

Celanese Corporation of America
Plastics Division
290 Ferry St.
Newark 5, N. J.

The Dow Chemical Company
Midland, Michigan

E. I. duPont de Nemours & Co.,
Polychemicals Dept.
Du Pont Building
Wilmington 98, Del.

Chemical Sales Division
Firestone Plastics Company
P. O. Box 690
Pottstown, Pa.

Chemical Division
The General Tire & Rubber Co.
Akron, Ohio

B. F. Goodrich Chemical Co.
Rose Bldg.
Cleveland 15, Ohio

Goodyear
Chemical Division
Akron, Ohio

Cellulose Products Department
Hercules Powder Company
Wilmington 99, Del.

Hooker Electrochemical Co.
47th Street
Niagara Falls, N. Y.

Koppers Company, Inc.
Chemical Division
Pittsburgh 19, Pa.

Marbon Chemical
Div., Borg-Warner
Gary, Ind.

Monsanto Chemical Company
Plastics Division
Springfield 2, Mass.

Naugatuck Chemical
Div., U. S. Rubber Co.
Naugatuck, Conn.

Rohm & Haas Company
Washington Square
Philadelphia 5, Pa.

Plastic Coatings—Peelable

Stanley Chemical Co.
East Berlin, Conn.

Trans-World Corp.
1707 N. Alexandria Ave.
Los Angeles 27, Calif.

Plastic Tapes

Minnesota Mining & Mfg. Co.
St. Paul 6, Minn.

Polyken Industrial Tapes Dept.
Bauer & Black Co.
222 W. Adams St.
Chicago, Ill.

Plastic Coatings, Protective

Amercoat Corporation
4809 Firestone Blvd.
South Gate, Calif.

The Atlas Mineral Products Co.
Mertztown, Pa.

Chemical Mfg. Div.,
M. W. Kellogg Co.
Danforth Ave.
Jersey City, N. J.

Quelcor, Inc.
West Front St.
Chester, Pa.

Seal-Peel, Inc.
Van Dyke, Mich.

Plastic Panels—Translucent

Alsynite Company of America
4654 De Soto Ave.
San Diego 9, Calif.

Chemold Company
2300 Broadway
Santa Monica, Calif.

Corrulux Division
L-O-F Glass Fibers Company
410 Holmes Road
Houston 25, Texas

Filon Plastics Corp.
2051 E. Maple Ave.
El Segundo, Calif.

Resolite Corp.
Zelionople, Pa.

Rohm & Haas Company
Washington Square
Philadelphia 5, Pa.

Strick Plastics Corp.
P. O. Box 5037
Philadelphia 11, Pa.

Plastic Sheets—Rigid

American Agile Corp.
Bedford, Ohio

Bolta Corp.
Lawrence, Mass.

H. N. Hartwell & Son, Inc.
Park Square Bldg.
Boston, Mass.

Plastic Pipe

American Hard Rubber Co.
93 Worth St.
New York 13, N. Y.

Anesite Company
3575 Tuohy Ave.
Chicago, Ill.

Atlas Mineral Products Co.
Mertztown, Pa.

Carlon Products Corp.
10225 Meech Ave.
Cleveland 5, Ohio

Clopay Corp.
Cincinnati, Ohio

General Plastics Corp.
Marion, Ind.

H. N. Hartwell & Sons
Park Square Bldg.
Boston, Mass.

Haveg Corp.
Marshallton, Del.

The Plastex Pipe & Extrusion Co.
Columbus, Ohio

Yardley Plastics Co.
Columbus, Ohio

Valves and Fittings

Many manufacturers of standard metallic valves and fittings are now marketing a line of valves made either wholly or in part of plastic materials. Fittings are generally available from dealers who handle plastic piping.

Plastic Screening (Insect, Filtering, Straining)

Lumite Division
Chicoppee Mills, Inc.
Paterson, N. J.

Firestone Plastics Co.
Pottstown, Pa.

Plastic Shapes (Bushings, Packings, Rods, etc.)

Chemical & Power Products, Inc.
7 Broadway
New York 4, N. Y.

Garlock Packing Co.
Palmyra, N. Y.

Polymer Corp. of Pennsylvania
Reading, Pa.

This listing is by no means complete. We suggest that readers looking for specific data on manufacturers of specialized products refer to directories such as Thomas' Register or Macrae's Blue Book.

Photo: Alsynite Company of America

Plastic reinforced with glass fibers is serving industrial plants in many ways. One of them shown here is a built-in light source. Corrugations in plastic are made to fit all standard metal corrugations for easy nesting and installation

handle the above-mentioned problems successfully?"

Inasmuch as the answers to question No. 7 were simply reiterations of the problems stated in question No. 6, we decided not to summarize these answers. This was no fault of the respondents; it was a faulty method of questionnairing.

Supply No Problem

Question 8. "Have you encountered any difficulty in finding a convenient source of supply of any needed plastic?"

Apparently, this is not one of the greater problems being faced by plant engineers although an extension of 23 "yes" answers would indicate that it might be of some significance to manufacturers in dollar volume of sales lost. On the other hand, it is also equally possible that these "yes" answers were representative of 23 industrial plants which had little or no interest in the use of plastics.

Question 9. "Do you feel that the materials manufacturers and the industrial press have done a good educational job for the plant engineer on the properties and applications of plastics?"

Apparently there is little to complain about on the score of education and information although this conclusion does not exactly tally with some of the answers to Question 1 and to Question 10 below. One hundred and forty-nine respondents felt that a good educational job was being done while 68 felt that somewhere along the line they were being neglected.

Question 10. "If not, can you suggest a more efficient means of accomplishing this end (education and information)?"

Leading the suggestions, with 75 votes, was the medium of "how to do it" bulletins issued by manufacturers. Fifty-eight respondents wanted more technical literature; 45 wanted industrial magazines to pay greater attention to data on plastics, their properties and handling; 36 respondents thought that there should be more speakers available from plastics manufacturers at general engineering meetings such as, we assume, the various plant engineering societies around the country. Twenty-five felt that more and better advertising should be done by both plastic manufacturers and suppliers.

Among the comments made to Question 10, one of the most pertinent was the fact that the plastics manufacturers should supply the plant engineer with material which they could use to "sell" management on the use of these generally higher-cost materials. Another one wanted very much the same information. He asked for "specific illustrations of actual applications and comparisons of cost over older (conventional) materials".

The most widely voiced complaints were to the effect that: 1. Practically all advertising used only trade names and they were thus unable to compare similar materials — such as PVC — manufactured by several concerns; 2. Many readers stated — and probably the remainder left it unstated — that advertising should carry more engineering data on both the chemical and physical properties of the plastics advertised. As one respondent put it, "There are too many optimistic recommendations now current. Apparently manufacturers don't know enough about their product and don't communicate fabrication information to users."

Help Wanted

Question 11. "At the present time, when you have a problem involving the possible use of plastics, where do you look for information and help?"

The biggest single category included in this answer was industrial publications and directories with a total of 130 mentions. Among those specifically mentioned were: Conover Mast Purchasing Directory, Hospital Directory, Materials and Methods, Modern Plastics Encyclopedia, PLANT ENGINEERING, Plastics Journal, Plastics World, Sweets Catalog Service, Telephone Redbook, and Thomas' Register.

The second greatest single source of information was manufacturers, with special mentions for: Bakelite Co., Borden Chemical Co., Dow Chemical Co., Du Pont, Glass Fibers, Inc., Herschell Engineering Co., Pittsburgh Plate Glass Co., Plastic Center, Monsanto Chemical Co.

Others ranged from "sales representatives" to "no place — not around here."

Question 12. "If the manufacturers and producers of plastics could provide you with any desirable set of properties in these materials, what would you ask for?"

Leading the list in desirable characteristics mentioned was "stability" with a total of 56 mentions. This quality, however, was broken down into color stability, dimensional stability, stability under impact and stability under heat and high temperatures. The last characteristic was mentioned 36 times as being desirable.

Second in order of importance was "corrosion resistance (including chemicals)" with 34 mentions; this was followed closely by "strength" with 20 mentions. Other characteristics which were mentioned more than once were "abrasion resistance" with 7 mentions; "flame and fire resistance" with 6 mentions; "lower cost" 8 mentions; "light weight" with 4 mentions; "freedom from toxicity" 3 mentions; "highest possible light transmission" 2 mentions; "non-sticking characteristics" 2 mentions; and "ease of working, maintenance and fitting" with 11 mentions.

"Dippable, Sprayable"

There were hundreds of other types of characteristics which each respondent needed to solve his own particular problems. For example, one reader wanted a plastic with ". . . nonkinking bendability, low friction, more reasonable prices on fittings." Still another asked for "a tubing that could be used for direct expansion ammonia coils or brine coils in refrigeration."

Still another one wanted "a material which could be applied to steel surface by dipping, spraying or flow coating and have a good bond, a tough smooth surface which would not peel or chip."

Another asked for "a material that would be light in weight, comparing with canvas, could be rolled on a rod and withstand a humid atmosphere of 185 F."

Still another respondent with one particular problem in mind asked for a plastic that would have "resistance to cracking when run over occasionally by such things as light vehicles and passenger cars."

Another one wanted a plastic that "would have the same quality at 30 F as it did at 200 F and vice versa."

Question 13. "Name one or two specific problems you have or have had that might be solved by this 'ideal plastic'."

Here, obviously, the answers were quite closely related to the answers given to Question 6, "What maintenance or construction problems have you had which are not currently being solved satisfactorily by any conventional material?" For example, if a man had a problem with broken windows, he, naturally, wanted an unbreakable material for glazing. Or, if he was having trouble with tank linings becoming corroded at high temperatures, he wanted high temperature corrosion resistant tank linings. So, although this was no fault of the respondent, the questionnaire in itself was faulty in this respect in that it demanded answers to an already answered question.

The fourteenth and last item in the questionnaire was simply titled, "Comments" and this portion received probably the greatest attention from the respondents but much of it was repetitive.

Some of the more specific and interesting comments were as follows:

"Good articles and information regarding application of plastic materials, particularly what their limitations are, are difficult to find. Most of the printed material is 'high colored' with numerous claims which omit a few important facts. For example, claims have been made for one material to the effect that it resisted corrosion and heat. They completely overlooked the fact that the plastic is not stable at a 8.0 pH or higher."

"Piping and fittings should be standardized by all suppliers just as metallic piping and fittings are so that competitive bids would be easier to obtain."

"Through lack of sufficient information we are not certain just what kinds of plastics are available. We would suggest more literature and information be made available. In the operation of a demineralizer in our plant the flow is controlled by a solenoid valve which operates 'full on' or 'full off'. This again sets up shocks causing excessive leakage in threaded fittings and, during the regeneration period in manually operated valves, and in pipe fittings."

One completely happy customer simply states, "We use corrugated plastics for windows and ceilings. It's wonderful."

Books to Buy

Two sources of information extremely helpful to buyers of plastics are the "Retailers' Plastics Manual" published by The Society of the Plastics Industry, Inc., 67 W. 44th St., New York, N. Y. Price, 50 cents per copy, and "Plastics in Building" published by Building Research Institute, National Research Council, Washington, D. C.

Corrugated plastic can be used effectively as shown here: for light admission where good seeing conditions are important
Photo: Corrulux Div., L. O. F. Glass Fibers

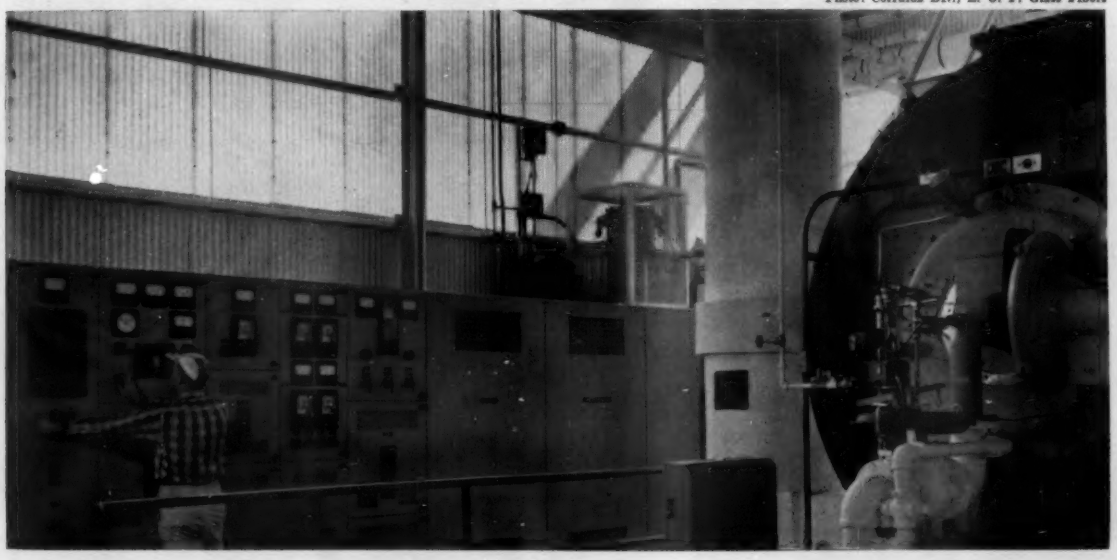


Fig. 1. Main entrance of Training Center faces same street as the main office and is architecturally similar to it

Training Center at "The Mill"—

Has What it Takes to Fit Young Men into Company Operations

TECHNICAL TRAINING of employees is an old established practice at Cincinnati Milling which has been at it since 1884. Over the years as the company expanded, its need for craftsmen grew. Consequently, training activities reached a point where additional facilities became necessary and a new training center was built to take care of the increased needs.

Here, young men who are high school graduates, co-ops from several colleges and high schools and college graduates receive training in modern manufacturing technique. The company offers twenty-four formal training programs, extending over two to four year periods to co-operative, apprenticeship and college graduate students. Work is done under the guidance of D. F. Pratt who is the director of training. Additional training in evening school, at company expense, is required of most trainees.

Fig. 2. Trainees have access to a technical library in the Center for quiet study

Physical features of the areas in the new center that are frequented by trainees during their training periods are outstanding. Rooms are well illuminated and air conditioned, Fig. 3. One of these is a library that is stocked with technical books and trade papers for use by the students, Fig. 2. For trainees taking the two year engineering drawing course, there is a spacious drafting room which is equipped with modern drafting tables and machines.

Large group meetings can be handled nicely in the auditorium which comfortably seats over 250 people. An unusual feature about the stage is that it has a built-in turntable which can be used quite effectively for sales training purposes. A commercial type of projection room is available for film and slide instruction work.

Trainees are given an opportunity to put their knowledge to work in a large well equipped machining section which is stock with over 100 modern machine tools in addition to precision tools for layout, inspection and assembly. Every trainee is trained on real work assignment selected from the main plant production and engineering files.

The building has other areas not necessarily pertaining to training activities. For example, in the lobby

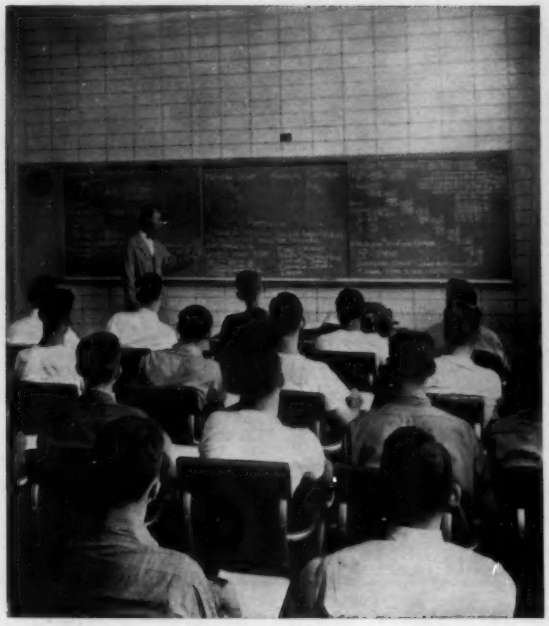


Fig. 3. Technical details are studied in air-conditioned room

Fig. 4. Scale-size layout of buildings is in the Center lobby

there is a model layout of the company grounds that is quite elaborate and impressive, Fig. 4. Small light bulbs located on the layout are connected electrically to push buttons which are marked according to the various building locations. By pressing, for example, the button marked "Special Products Division Plant," one can readily spot its location by the bright glow.

Two dining areas are included in the building. One is set aside principally for executive use, Fig. 5, and the other room is available for large visiting and customer groups. The latter dining area has an outdoor effect in that it is enclosed by large glass panels on three sides and it overlooks the company sponsored Boy Scout log cabin lodge.

The metal cutting and physical research laboratory occupies some of the space on the ground floor of the new north wing of the engineering and headquarters building. Here, studies are made of equipment as well as cutting tools. The latest techniques are used to check the wear of tools and use is made of radioactive material for this purpose.

The laboratory area where cutting is done with radioactive tools is separated from the other activities by a masonry partition and heavy glass panels, seen in Fig. 6.

Fig. 5. The Training Center contains executive dining room

Fig. 6. Radioactive studies are made in lab area of building

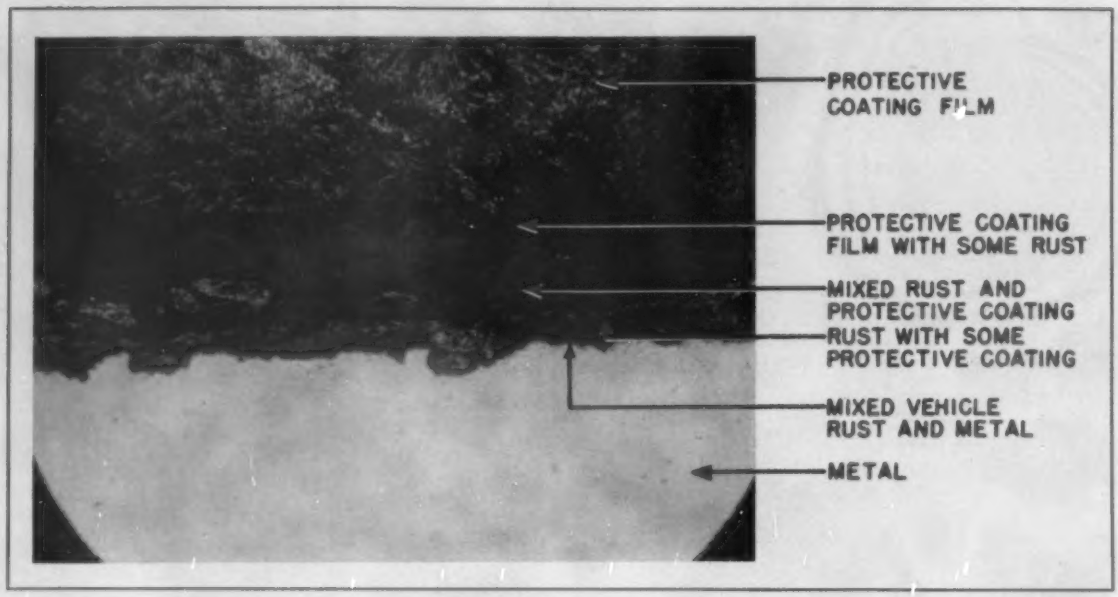

PROTECTIVE COATING FILM
PROTECTIVE COATING FILM WITH SOME RUST
MIXED RUST AND PROTECTIVE COATING
RUST WITH SOME PROTECTIVE COATING
MIXED VEHICLE RUST AND METAL
METAL

Fig. 1. Microphotograph of cross section of one of the samples showing six zones visible through careful examination

Isotopes Again Get Industrial Headlines . . . They Prove:

Rust Preventives Really Penetrate

Isotopes are continually cropping up as the radioactive friend of plant engineers . . . Sometimes they serve him directly; at other times they aid him indirectly by improving, or proving, products he uses in construction and maintenance . . . Presented here is a story on the latter activity

ANOTHER EXAMPLE of the ever-increasing usefulness of industrial isotopes to the plant engineer has just been reported by one of the nation's leading research laboratories, Battelle Memorial Institute. In this case it involves the use of isotopes to reassure the plant engineer that rust preventives really penetrate through rust and get down to the bare metal with resultant protection.

Radioactive Vehicle

One of the major difficulties lying in the path of industrial researchers previous to the accepted use of isotopes has been the near-impossibility of accurate measurements. Readers of PLANT ENGINEERING may recall an article which appeared in the April, 1952 issue describing the use of isotopes by Atlantic Refining Company in its investigation of engine wear.

In the case at hand, the researchers employed a radioactive fish oil prepared by the esterification of C^{14}—(Carbon 14) labeled glycerol and fish-oil fatty acids obtained by the saponification of the original fish oil . . . found in the rust preventive under examination, Rust-Oleum.

With the usual degree of thoroughness exhibited by research laboratories of the caliber of Battelle, the report describes the detailed procedure employed in the investigation. The preparation of specimens from rusted steel plates was explained as follows: Disks, 1 in. in diameter, were stamped from the plates and mounted onto ¼-in. thick steel cylinders. The disks were mounted in this manner so that they could be used in the radioactivity detection apparatus.

"Next, the rusted surfaces were wire brushed and coated . . . in accordance with directions given on a can of the . . . product . . . The coated specimens were allowed to dry in the laboratory for approximately two weeks." Then, the degree of penetration of the radioactive component of the product was determined by a radioactive lapping technique. This

Table I. Radioactivity of sample at various depths during removal of coating

Distance From Surface, Mils	Radioactivity[1]		Per Cent of Metal Area Exposed
	Counts Per Minute	Fraction of Surface Activity	
0.0	738 ± 26	1.0	Coating Curled
0.4	702 ± 27	0.95	
5.1	143 ± 22	0.19	12
6.0	63 ± 32	0.09	42
6.3	65 ± 46	0.09	60
6.6	28 ± 75	0.04	75
7.3	7 ± 113	0.001	85

[1] Data corrected to take into account relative amount of exposed metal after each lapping.

method consisted of mounting the specimens in a lapping fixture that made possible controlled removal of the surface layer. Crocus cloth was used as an abrasive and micrometer measurements were made before and after each lapping cycle to determine the exact amount of surface removed.

Making Measurements

Following each lapping of the specimen's surface it was necessary to measure the radioactivity of the newly exposed surface. These measurements were made with both an end-window Geiger-Mueller tube and with a gas-flow proportional counter. Because of the low energy of the beta particles emitted by C^{14} this radiation is readily absorbed by matter. The beta particle range in the coating film of the rust preventive is approximately 2 mils. Since it was desirable, Battelle believed, to measure the radioactivity of a 0.5-mil-thick surface layer, the measurements with the Geiger tube were found more suitable.

However, as the coating and rust layer were removed by lapping, the residual radioactivity decreased and the precision of measurement by this means also decreased. It then became necessary to use a gas-flow proportional counter to verify the presence of the radioactive component in layers close to the bare steel surface where the radioactivity was relatively low. When using this counter the specimen is placed directly into the detector.

Charted Results

Radioactivity of the rust preventive coating and the rust layers as a function of the distance from the surface is shown graphically in Fig. 2. Corrections were made in the figures used for plotting this curve. For example, if a count of 125 was obtained when 50 per cent of the lapped surface showed bare metal, then the true count to be used for comparison with the surface count would be 250.

Microscopic examination of the cross section shown in Fig. 1. showed considerable irregularity in the metal-rust and rust protective coating interfaces. For this reason, the boundaries between the various layers could not be differentiated with precision. Visual examination of the cross sections showed six zones: protective coating film; protective coating film with some rust; mixed rust and protective coating; rust with some protective coating; mixed protective coating vehicle, rust, and metal; and metal. The Institute states that the irregularity of these zones must be considered in the evaluation of the penetration of the fish oil component of this product.

From the results of the lapping experiment, says Battelle, it may be concluded that the fish oil vehicle of the protective coating does penetrate the rust layer to the metal surface in measurable quantities. Measurements taken indicated a moderate decrease of radioactivity, and hence vehicle concentration, through the coating and rust film. As the metal surface was approached, a leveling-off of the concentration was observed. At the metal surface, where no rust was observed, no radioactivity was found. Within 0.5 mil of the bare surface of the metal approximately 3 per cent of the total fish oil vehicle was found.

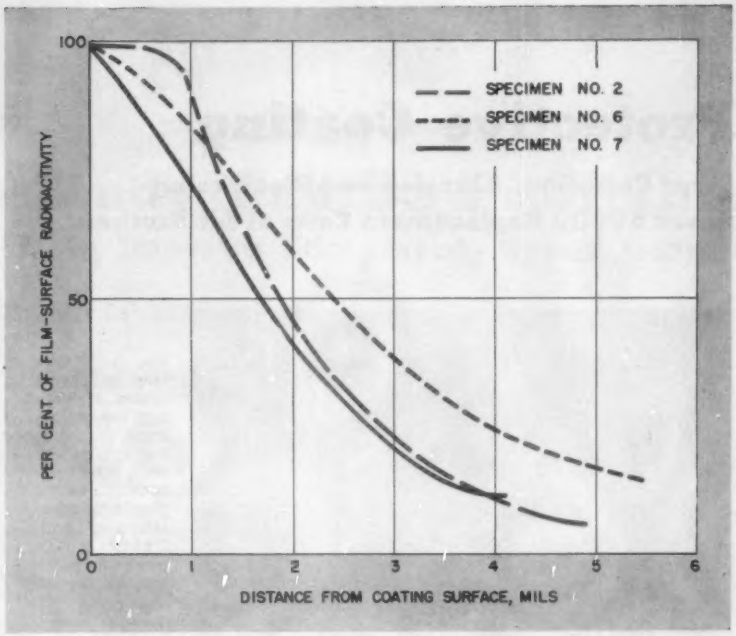


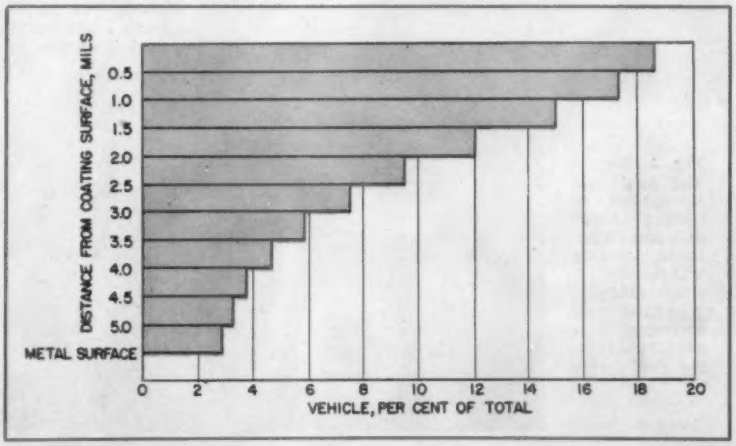
Fig. 2. Radioactivity of three of the samples with one coat of rust preventive

The precision of the radioactivity measurements, according to the Battelle report, was poor in this particular layer when using a Geiger-Mueller tube.

However, measurements made with the gas-flow proportional counter in this region verified the presence of sufficient radioactive fish oil vehicle to substantiate the data obtained with the Geiger-Mueller counter.

As long as some of the rust could be observed on the surface of the metal, the gas-flow proportional counter detected a measurable amount of radioactivity.

Fig. 3. Distribution of the vehicle in the protectively-coated rust layer. Measurements were taken immediately following each of several lapping operations



Protective Coating

Stops Corrosion, Abrasion and Weathering Saves $9000 Replacement Costs at Lit Brothers

Fig. 1. First step in preparation of cooling tower surfaces for coating application was the removal of a year's accumulation of rust. Putty knife proved good tool for the job

Fig. 2. After cleaning and removal of rust, application of one coat of Corrocote primer was next step. Primer is allowed to dry for four hours, patching is done after primer is down

Fig. 3. When primer is dry, first application of neoprene base coating is made. Material is "flowed" on for best coverage. Each coat dries for an hour before next is applied

Fig. 4. Second and final coat is applied to cooling tower drip pan. When cured, coating will resist abrasion, sunlight, weather and corrosion. It is self-vulcanizing, fast drying

SPECIALLY COMPOUNDED on a neoprene base, Corrocote, a protective coating, has completely eliminated corrosion of drip pans of air conditioners and cooling towers at Lit Brothers department store, Philadelphia, Pa. The best coatings formerly used lasted little over one year and could not be used for patching in areas where pitting was severe. Pinholes were common, and some pans had holes the size of a penny.

With the new coating, management reported an estimated $9,000 saving in replacement costs. The original application is still intact after two and a half years, and no maintenance has been required during that period. Additional service life is estimated between four and six years.

Before applying Corrocote, pan surfaces were scraped with a putty knife. Next, a coat of Corrocote primer was applied and allowed to dry for four hours. Two heavy coats of Corrocote followed, with an hour of drying time between coats. Holes were patched by covering them with metal or canvas patches laid on after the prime coat had dried. The patches were thickly saturated and covered with the final coat, making them integral parts of the coating.

Corrocote guards surfaces of many materials against moisture, oils, chemical fumes and splash, salt air and fungus corrosion. Applied by roller, brush, spray or dip, the film dries quickly and self-vulcanizes to form a firm, rubbery barrier. The addition of oils or plasticizers is not necessary to obtain elasticity.

The cured film resists abrasion, will not support combustion, resists sunlight and weather, is a non-conductor and effectively counteracts electrolytic corrosion.

On walking surfaces—metal, wood or concrete—when the coating is sprinkled with sand while wet, the surface has excellent non-slip qualities.

It is available in gray, black, aluminum and red, and applications include: exteriors of pipes, tanks, vats, ducts, structural steel; repair of conveyor belts; use on power transmission shafts, valve parts, bushings, air conditioning and ventilating equipment; lining for fans, impellers, ducts; protection for floors, duck boards and concrete against acid or caustic attack; electrical switch and terminal housings; and marine gear.

Want More Information?

For complete details on the applications of this coating, write to the Editor, Plant Engineering, 110 S. Dearborn St., Chicago 3, Ill., or write "Corrocote" on the postage-paid card in this issue.

A Cost-Cutting Case History

Maintenance Study Can Be Profitable

Lever Brothers Uses It to Improve Equipment, Speed Output

By EDWARD M. BENJES, Lever Brothers Co., Baltimore, Md.

MAINTENANCE CAN DO what you want it to do. It can cost you money or save you money. It can be a monotony of oft-repeated tasks from which you learn nothing or it can point the way to better equipment, faster methods and higher production.

We at Lever Brothers have decided to make an ally out of maintenance. (When you can't beat 'em, you'd better join 'em.) To illustrate just how we have utilized plus values of maintenance, let's look at the maintenance record of one piece of equipment—our pneumatic power handling system. The same story could be told of many other pieces of equipment.

Maintenance is onerous and costly. Therefore, if we continue to perform these same maintenance jobs day in and day out, learning nothing from our efforts, we have accomplished little of positive value to eliminate the recurrence of these jobs.

Subject of the article, the pneumatic handling system is pictured diagrammatically in Fig. 1. The system is adapted to unloading bulk powdered material from railroad hopper cars. In operation, the motor-driven blower creates a partial vacuum in the bag separator and in the pipe line to the hopper car. By means of the unloading pan shown in Fig. 5 and a section of flexible rubber hose, air and powder from a hopper car is introduced into the pipe line. The air can enter with the powder or through the opening provided by the double pipe arrangement on the unloading pan.

Next, the air-powder mixture enters the bag separator tangentially to effect a centrifugal separation. The powder falls into and is removed by the rotary air lock, while the air passes upward through cloth filter bags. The filter bag area is divided into four separate compartments, each with twenty bags. To remove accumulations of powder from the bags, each of the four sections is arranged with a shaking device and a valve which isolates the section while shaking is being done. The powder can be diverted to inside or outside storage and can be removed from outside storage by the same method as unloading a hopper car.

Only the filter bags prevent dust from escaping into the atmosphere. This makes bag maintenance an important function. A cost analysis showed that our yearly bill for bag maintenance was approximately $2,000 which represented a major part of the total maintenance cost. Replacements were running about 30 bags per month and servicing was more or less weekly.

An informal program was instituted to inspect all bags removed from service. Instructions on proper bag installations were formalized, and each craftsman involved was advised so that uniform procedure would be followed. All bags were to be removed for close inspection and good bags reused.

The change in the maintenance method applied in the above move is of considerable import. "Call maintenance" has now been supplemented by "scheduled maintenance." As the pneumatic handling system is equipped with a number of identical parts, in this case 80 cloth bags, it can be demonstrated that the application of "scheduled maintenance" will result in a lower cost.

This idea is generally applicable whenever there is a multiplicity of similar items such as tubes in a heat exchanger, electric lights in area illumination service, or as in the case under consideration, cloth bags in a filter. If maintenance removes only the bags that have failed, e.g. have holes in them, this would be similar to replacing only those electric lights that have burned out. In due time, there will exist a mixture of bags or lights in all age brackets. Therefore, more or less at random, another bag or another light will fail, resulting in never-ending "call maintenance."

If the maintenance effort is expended at a time when the equipment is still in operating condition and at a time convenient for both production and plant engineering, a less hasty, more thorough job can be done. In the case of equipment like electric lights where conditions of operation are more uniform and the service life of a single bulb is more definite, the lowest cost maintenance operation can be determined by arithmetic. In the case at hand, only the principle can be applied as sufficient knowledge of the life and service characteristics of the bags is not known.

So, proper maintenance of the filter bags called for the removal of all bags at one time. As all bags were inspected, good bags could be combined and used over in one section of the filter. As the filter is composed of four separate sections of twenty bags each, on occasion it was possible to have all new bags in at least one section, thereby putting the section so equipped in first rate condition. Thus, one section should be good for a long period, while three sections only would be subject to more imminent failure.

Why Bags Fail

Information was gained as to identifiable characteristics of bag failures by the above inspections, and two corrective measures were decided on.

The first step is shown in Fig. 2. The shake action in jostling the bags caused adjacent bags to hit at the spot marked "Point of Failure," eventually wearing a hole. The use of a strip of gum rubber tied on the bag holder with ordinary twine eliminated this particular breakdown.

The second step is shown in Fig. 3. An examination of the point of entry into the air-power separator suggested that if separation efficiency could be improved, less powder would be drawn into the bags, thereby reducing the service requirement. The sheet metal cone was installed to create a new whirl chamber and to change direction of the air stream in order to drop out the heavy powder.

Records of bag maintenance showed a marked change after the chamber was installed. This too, resulted in a substantial labor saving. Time interval between bag repairs lengthened from weekly to monthly. However, the same quantity of bags—30 per month—was used.

(Please turn page)

Consideration was also being given to various bag materials. It was decided to institute a test by installing four materials, one of each type, in the four chambers. The inspection of bags was intensified, each of the 80 locations being identified and all bags with failures were given two inspections. Records were maintained detailing differences in the failures.

A failure shortly after the material test was started sparked a general shop discussion among maintenance supervisors. It was decided to make a general overhaul of the shaker mechanism components, both electrical and mechanical. It appeared unreasonable that a new bag should fail as rapidly as the material test had disclosed, and improper shaking was suspected.

An investigation was also made into the shaking cycle as it was concluded that reduced shaking would improve bag life. The overhaul work disclosed three items which proved to be of importance. Each bag chamber is equipped with a motor-operated, shut-off valve, which when closed cuts suction off the chamber so the shake cycle can proceed. If suction is left on the chamber during the shake period, the powder is drawn up into the bag rather than shaking out into the lower powder air lock.

The control motors were found to have defective contacts which could have caused the air valve to remain open. In addition, the lever, by which the control motor operates the shut-off valve, is fixed in position with set screws so the valve is closed when the control motor is in "off" position. It was found that the set screws had worked loose causing a malposition of some of the levers. After the valves were repositioned, the levers were fixed in place with pins.

The third item, shown in Fig. 4, shows the upper part of the valve seat to be quite close to the fulcrum point. Thus, a small foreign body on the seat at the upper part of the valve could hold the valve open an appreciable degree. An accumulation of powder had hardened in the valve and was preventing complete closure. To make a seat capable of adjusting to powder buildup the molded rubber gasket was installed.

When these alterations had been made, the equipment was returned to service and the bag material test, previously mentioned, was continued. The data collected for the material test also composes a record of the bag maintenance. The data and results of the bag material test are presented in Table I.

Cotton Bags Best

An analysis of this table shows that our maintenance efforts were paying off. For the unit, bag usage was under 10 per month compared to previous figures of 30 per month. The material which showed best results was cotton, the lowest unit cost material. Most of the bags that failed did so in locations next to the steel shell of the bag compartment; holes were worn in the bags at the side adjacent to the steel shell.

It appears that any condition which allows the shake cycle to proceed with the air shut-off valve remaining open will result in the bags becoming filled with powder. After the bags become filled, the continued shaking bangs the bags against the tank side wearing holes in the bags. The second type of failure is caused by the same filling of the bag with powder; however, the weight of the powder causes the bag to fold over at the lower part causing a sharp crimp, whereupon continued shaking creates a small hole at the crimp point.

Fifth, sixth and seventh failures occurred within a rather short period and indicated a change had occurred since the original overhaul. As the accumulation of hard powder seemed to be the most logical offender, a maintenance effort was made involving recleaning of all valve seats. After the cleaning was accomplished, no further failures occurred during a three-month period after February.

As previously mentioned, the shaking cycle was analyzed to determine if less shaking would accomplish removal of powder from the bags. The complete cycle of the shake sequence covered about 10 minutes and each section was in "shake" for about two minutes. Thus, one section was almost always in the shake period and only three sections in service.

Sequence of the shake cycle is controlled by a motor-driven timing mechanism, which automatically starts and stops the shaker motors and opens and closes the bag chamber shut-off valves. It was decided to install an additional timer so as to remove electric power from the original motor for the period of time selected during which no shaking at all would be done. Thus, if the new timer is set for a one-hour "off" period, the shake cycle is stopped for one hour and then proceeds through the original 10-minute cycle.

At the conclusion of one 10-minute shake cycle, the new timer starts and for the next hour all power is removed from the original timer. Thus, all four sections are in service most of the time and the bags are shaking only a fraction of the time consumed previously. Examination and tests disclosed the unloading rate was not adversely affected and excess powder did not build up on the bags.

Table I. Analysis of this filter bag test table shows cotton best for filter bags

Section	1	2	3	4
Type Bag	Nylon-A	Nylon-B	Dacron	Cotton
Test Start	June	June	June	June
1st Failure	1	1	0	0
2nd Failure	2	3	3	0
3rd Failure	9	6	9	0
4th Failure	1	0	0	0
5th Failure	4	1	1	0
6th Failure	14	5	10	6
7th Failure	0	5	0	0
Test End	Feb.	Feb.	Feb.	Feb.
Elapsed Months	9	9	9	9
Total Failures	31	21	23	6
Bags Failed Per Month	3.4	2.3	2.5	0.66
Original Bags Still in Service	2	4	1	14
Elapsed Days to First Failure	13	26	13	264
Total Failures Bags Adjacent to Metal Tank Side	19	13	18	5

Cuts $1600 Off Bag Cost

At this writing, the improvement the timer installation may make is not known as bag failures are so few that an extended period will be required to gather data. For the above reason, cost figures are not available but indications are that the former $2,000 per year cost of bag maintenance may now be in the order of $400 per year or less.

The second phase of this maintenance story concerns efforts made to

(Continued on page 230)

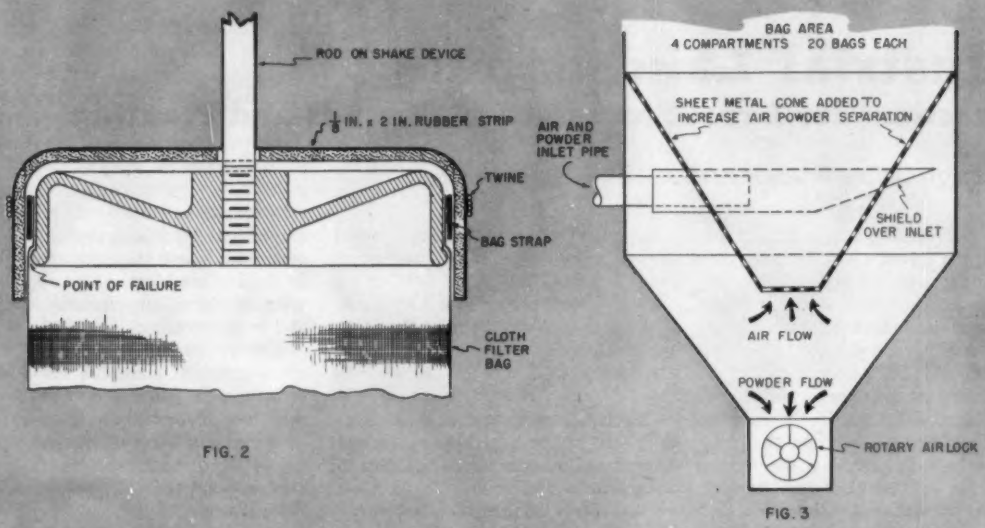


FIG. 2

FIG. 3

Figs. 1 through 5 show the over-all system (in the center) with the various modifications mentioned in the text around the perimeter

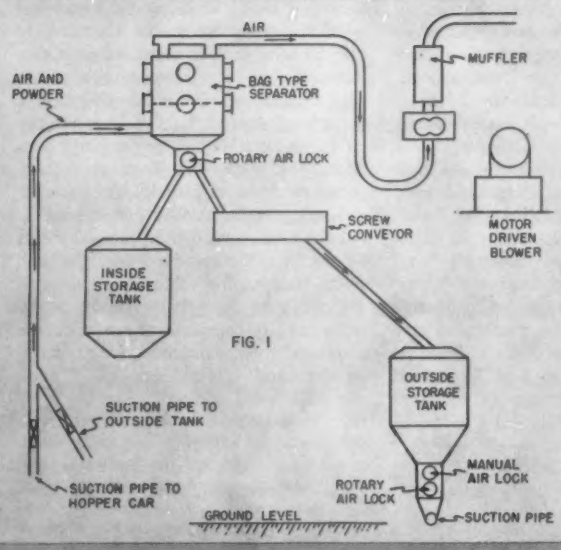


FIG. 1

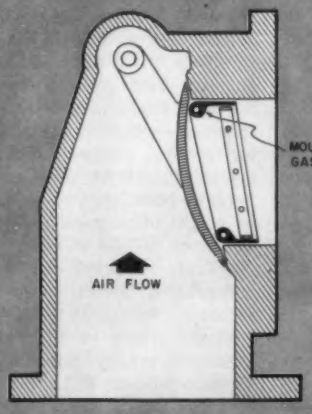


FIG. 4

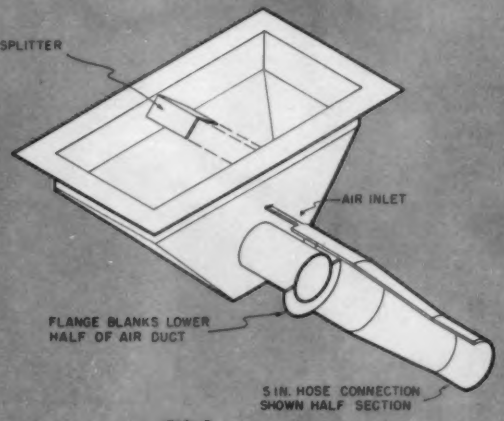


FIG. 5

Industrial Landscaping

Suggestions for Layout and Care of Grounds and Planting

By H. P. QUADLAND, American Association of Nurserymen

PLANNING THE landscape so that the plant building and the surrounding area blend well can be quite a task. It is well, when arranging, to aim for both functional use as well as an attractive display.

The approaches for landscaping a new building or an existing structure are somewhat different. In the case of a new building, a landscape nurseryman can help in planning the whole site for use and beauty, even beyond the walls of the structure, when the structure is in the planning stage. This may include walks, drives, recreation areas, lawns, gardens, and similar features of unified landscaping. Or it may include just the planting itself, according to the landscape plan.

In the case of an existing structure, where all features such as walks and drives already have been established, it is a matter of landscaping for beauty and use with the facilities at hand. Foundation plantings, trees and shrub plantings, including flowering and evergreen plants and improved lawns, may be all that is required to change the appearance of the plant and give it a more modern, progressive look.

Both in planning and in actual planting, the foundation planting is especially important. It must tie the building to its natural setting. Even in congested industrial areas there usually is room for a planting of evergreens or trees that will thrive under the worst conditions of city smoke and gases.

Use of plant grounds for recreational purposes where there is the space has expanded widely in recent years. The recreational area can be, as some now are, an untended drab affair of bare ground for such activity as baseball; or it can be a park-like area, well planted and maintained, with beautiful lawn, shrubs and trees.

Some firms have established exquisite personnel gardens, cafeteria gardens and lovely walks and drives lined with flowering trees. No matter how old, or how drab a plant may appear, it can be made attractive with plantings. Attractive rose gardens are a feature of interest. In some plants they have been established by company garden clubs, with very little or no expense to the company itself.

Zoning laws have been waived in numerous residential communities where the structures have been planned with landscaping that conforms to standards fit for lovely homes. Many public utility companies now landscape electrical substations both for approval by surrounding residents and to comply with local zoning.

It appears that the best procedure is for the plant engineer and other company executives to discuss the extent to which the plant site will be landscaped and for what purposes. A competent landscape nurseryman might sit in to give his ideas, or be approached later by the plant engineer for plans and cost estimates.

The problem may be very simple for foundation plantings for a single structure. In some cases, however, it may call for extensive planning and planting of the whole site, with plantings along driveways and walks, recreation areas, employee gardens and similar features.

There is no such thing as "typical landscaping," because it varies so widely among companies, with each site being treated differently to get the most value from it. The objective is to obtain the most beauty and utility out of the existing grounds.

Landscaping Guide

There are general principles to be observed in landscaping, some of which are:

The planting should make a structure fit in with its natural surroundings. It will tie the structure to the earth and sky in a natural way.

Sound landscaping usually has a "center of interest." This may be a group planting of trees or shrubs, border planting along a driveway, or similar features.

Proper scale of trees and shrubs in relation to the size of the structure, or ground available is important. While no specific rule can be adopted, in general, the low, one-story building should have a low foundation planting. Dwarf type plants and small flowering and shade trees that do not grow over 25 to 40 ft tall are available for this purpose. This group includes flowering trees such as dogwood, crabapples, cherries, redbud and the lower growing maples, lindens, hollies and numerous coniferous evergreens.

Large buildings two or three stories in height often require higher growing trees. Shade trees in such cases may run to oaks, conifers, maples, honeylocust, sweet gum, magnolia, sycamore, and many other species.

Plants should be selected for their hardiness in the prevailing climate. There are some 850 species of trees in the United States and practically every good tree from the palm in Florida to the oaks and birches of the

Fig. 1. View of the Armco Steel Corporation, Middletown, Ohio, shows how industrial landscaping can be planned so as to be both functional and attractive

northern states have been used in landscaping.

Landscaping must enhance the existing type of architecture. There is great variation in landscaping, as in the case of a structure with glass windows close to the ground. Use of dwarf plants seems obvious in such cases. And yet where such windows face the west, resulting in intense heat and glare in the afternoon on summer days, there have been plantings of trees at some distance from the windows to shut off the glare and heat.

Often in situating a plant where the site is bare, large-sized trees are brought in to create the desired effect immediately rather than having to wait for them to grow.

Some industries have made good use of annual flower beds but on the whole, if they are extensively used throughout the property, they are expensive to maintain and must be renewed each year. Permanent border plantings generally are preferred. The permanent plantings reduce maintenance costs. Groupings of evergreens, including those that flower, are very effective. Deciduous shrubs also are used.

The style of the landscaping should conform to the architecture of the structure. A severe plant building will be softened and made much more attractive by evergreens and flowering plants, including roses. A well-tended rose garden is a beautiful sight in a personnel or cafeteria garden.

Fig. 2. Expert arrangement of plantings along the driveway of the Helena Rubinstein cosmetic plant in Long Island, N. Y., is an invitation to visitors

Selection of plant materials is of extreme importance. Trees live from 20 to approximately 3,500 years, according to genus. The landscape nurseryman will suggest plants that are suitable for the purpose. Selection of trees that are less susceptible to storm damage and disease is important.

All plant life requires adequate maintenance, including fertilization, and annual pruning where needed. Regular watering of the plantings is necessary if natural rainfall is insufficient. Probably more cultivated plant life has been lost by insufficient water during drought than for any other single reason.

Maintenance will include fertilizing and re-seeding lawns, usually twice a year, spring and fall, with new seed added where needed every year.

How Shakeproof Solved Several Landscaping Problems

By M. T. ANDERSON, Maintenance Engineer, Shakeproof Div. of Illinois Tool Works, Elgin, Illinois

SINCE THE plant was built on land which had previously been stripped to gravel, we had quite a problem with landscaping. The overburden and tailing had been deposited in windrows and uneven mounds, leaving a rather unattractive sight.

In an effort to improve the surroundings, the area was graded to give a suitable level for the parking lot, athletic field and front lawn. Much of the grading consisted of filling in with sand and gravel tailings and then spreading the available overburden over the area to be seeded. Evergreens were then purchased to make foundation plantings.

One area near the front of the property was approximately 15 ft below grade. We solved this problem by creating an artificial lake which is maintained at constant level the year around. The water for the lake comes from the paved areas in addition to clean water which is piped into this low area. A drain is connected to the storm sewer.

We have a number of annual plants in this area and, because of this, we have set up a makeshift solarium in our boiler house. We made two metal-lined boxes along the west windows and have installed a battery of fluorescent lights overhead. With this amount of light we are able to keep items such as geraniums, coleus and ivy through the winter as well as raise annual plants from seed.

Because of the nature of the soil and the contour of our unused land, reforestation is one of our larger projects. Each year we buy evergreen trees and multiflora rose seedlings from the state forester for planting. We propose to plant evergreens on 10 ft centers on several acres. Multiflora roses are planted along the fence line to provide a living hedge as well as cover for birds and small game. We have made such plantings each spring for three years and in spite of the high sand content of much of the soil, our losses have amounted to only about 20 per cent of the plantings.

Artificial lake (top) was created to take care of area 15 ft below grade. Company raises annual plants from seed in solarium (below) in boiler house

NEW DEVELOPMENTS

Stud Driver Adapts Itself to Practically All Kinds of Fastening Jobs

FOR GREATER USEFULNESS the Model 455 Stud Driver soon to be marketed by Remington Arms Co., Inc., has interchangeable barrels. Quickly removed and replaced, they adapt the powder actuated tool to either standard or heavy-duty fastening jobs.

Construction man uses the driver with its ¼-in. barrel for anchoring a wooden two-by-four to a steel upright

The new stud driver is an improvement over company's earlier models in that its interchangeable barrels permit use of a number of different "power loads" for delivering impacts of varying force. Each "power load" is designed for proper penetration in structural materials when used with alloy steel studs of the proper size and type. The Model 455 accommodates 25 types of ¼-in. studs ranging in length from 1 to 3¼ in.; or 12 types of ⅜-in. studs from 1½ to 4¾ in. long.

An operator can change barrels to convert from one stud capacity to the other in less than 90 sec, says company, and without leaving the job. A disc attachment on the heads of the studs permits dropping the studs into the barrel and a slide ejection of spent power loads clears the chamber.

A recently reported example of the speed and ease of handling possible with the new tool concerns its use in a plant alteration project. A man used the Model 455 to anchor an electrical conduit to a steel upright, fasten a wooden two-by-four to a slab of concrete flooring, then mount a steel plate to an I-beam support—all this in less than 5 minutes' time.

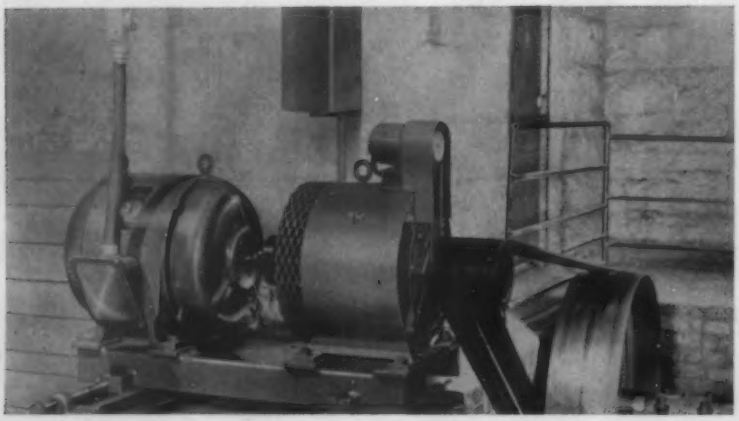
To learn more about the Model 455, just write "Stud Driver" on the Reader Service Card (see page 235)

The 32-caliber bushing replaces 22-caliber one in barrel changeover to set ⅝-in. studs with the versatile driver

Adjustable Speed Drive Offers Flexibility and Broad Application

THE AMPLI-SPEED Drive developed by Electric Machinery Mfg. Co. is declared so easy to install and operate that it can be used as a general purpose drive. According to manufacturer, it can be coupled or belted to an existing motor to provide speed control of ± 2 per cent for fans, centrifugal pumps and compressors—and it can handle constant torque loads, such as mills, conveyors and machine tools. With it, you can operate a load at optimum speed, change speed manually, or control it automatically.

One of five Ampli-Speed Drives at work in the Minnesota State Capital at St. Paul. They are belted to giant fans which circulate air throughout building



The system consists of: The Ampli-Speed Drive installed between motor (or other drive) and load; a wall-mounted magnetic amplifier speed control; and a control rheostat mounted where convenient. The drive consists of a "ring member," driven at constant speed by the motor, and a "magnet member," mounted on the output shaft, which turns the load. The magnet member is excited by d-c from control.

Speed is changed by turning the control rheostat knob or, automatically, by combustion, pressure or liquid level devices. Speed changes are claimed virtually stepless. During steady-state operation, feedback from a tachometer generator, on top of the drive, holds load speed to knob setting. The drive is designed for use with motor speeds of 870, 1150 or 1750 rpm. Ratings range up to 95 hp for fan-type loads.

For full details on this drive, write "Ampli-Speed" on the Reader Service Card. It's on page 235 of this issue.

AND APPLICATIONS

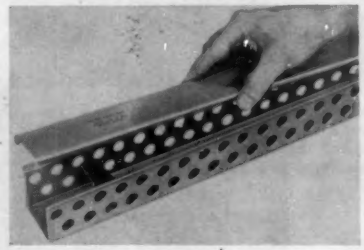
Rigid Vinyl Plastic Duct Makes Fast Work of Control Panel Wiring

FASTER WIRING and neater looking control panels are possible with a new plastic wiring duct. It is made by Taylor Electric, Inc., from rigid Geon vinyl material manufactured by B. F. Goodrich Chemical Co. This new duct is designed to hold, protect and distribute a harness. Installing this duct is reported to be three times as fast as lace and bundle wiring, and six to eight times as fast as flat wiring with clips. Also, changes in control panel wiring can be made more easily with it, since neither unlacing or relacing is involved.

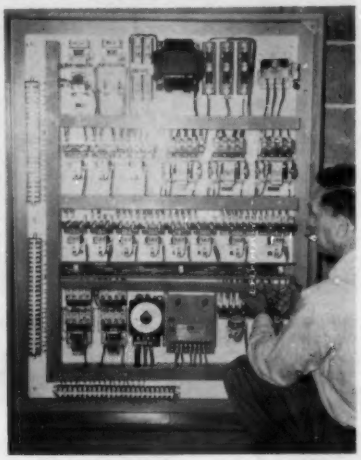
The wires are simply laid in the duct and distributed through holes punched uniformly in the sides. Holes for mounting are spaced in the bottom of the duct. Clips hold the wires in position. The plastic cover can be snapped on or off in a jiffy.

Geon rigid vinyl used in the duct has high impact strength, says manufacturer, yet it bends or forms to any shape. It cuts easily with a bandsaw, hacksaw, tinsnips—even a pocket knife. It resists effects of acids, alkalis and greases, and is non-combustible. Electrical characteristics of the material are claimed excellent. Eleven sizes and lengths up to 6 ft are available. Widths range from ½ to 4 in., and depths from ½ to 3 in. Taylor Electric will have control panel wires for you—or will supply this rigid vinyl wiring duct for your own plant use.

Use the Reader Service Card on page 235 to get more information on this. Just write "Wiring Duct" on the card.



When the wires are laid in the duct, the cover is snapped shut. Metal clips hold wires firmly in any position



In this control panel, wiring to the switches is led through holes spaced evenly on the sides of the vinyl duct

Portable Fluorescent Lamps Light Some of Industry's Darkest Problems

FLUORESCENT WORK LAMPS provide a safe and easily handled method of temporary illumination of dark spots and hard to reach areas, announces Day-Ray Products, Inc., manufacturer of the lamps illustrated. They supplement good general lighting, this company points out, and industrial requirements for such portable lamps demand that they be cool, easily handled, easily hooked on where needed, and rugged. And in some cases they must be perfectly insulated and water- and vapor-tight to conform to safety specifications for use in hazardous locations. A growing need for more light to cover larger areas has resulted in the recent addition of 15- and 30-w sizes to Day-Ray's line.

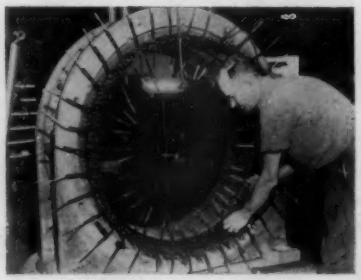
Current uses of the lamps, as reported by Day-Ray, include use of the new larger enclosed units for machine lighting... Steel guard units in the 30-w size are providing adequate light within and between storage bins ...An electrical manufacturer finds the 15-w units suited for use in wiring and for inspection of unit substation cubicles . . . Enclosed, 8-w units are used by a petroleum refinery to inspect the inside casing of water wells... Dairies say the enclosed lamp can take innumerable washings.

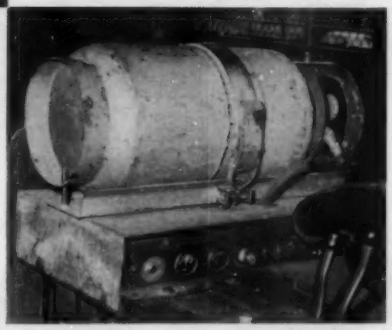
For more information on these lamps write "Portable Lamps" on the Reader Service Card (page 235 in this issue)

Portable fluorescent lamps provide cool light for many production jobs

They make barrel inspection an easier task in paint and chemical plants

They afford good illumination for electrical manufacture, repair work





Refueling is a simple matter. Valve is closed, copper tube fuel line is uncoupled and empty tank is lifted out of frame. After full tank is put in place, the process is reversed. Right: Close-up shows the flexible fuel line, at right, and the detachable band and spike which hold the propane tank in place

Fuel Change Cuts Costs,

Saving Sipi Metals $3,600 a Year

BY CONVERTING from gasoline-powered to propane-powered (LPG) industrial trucks, Sipi Metals, Inc., Chicago, has cut costs more than $3,600 a year.

Seven industrial trucks were involved in the conversion. These vehicles move a distance of 100 to 300 ft on each trip and carry an average of 2,000 lb per load. The material consists largely of scrap non-ferrous metals, packed in barrels, bales or left loose. Sipi receives this metal from scrap dealers and industry, alloys it, and then sells the finished product to foundries, typesetters, electroplaters and similar users.

Major savings were the reduced fuel bill and the drastic drop in engine maintenance costs, explains Joseph Levin, Sipi's production vice president. He mentioned several other intangible benefits, such as reduction of the fire hazard, faster refueling time and better performance under heavy load conditions.

A gallon of propane lasts about the same number of operating hours as a gallon of gasoline, but the cost of LPG is 22 per cent less. The company pays five cents a pound for LPG which comes to about 20 cents a gallon.

The trucks usually are used on a 24-hour basis, five days a week. Normal fuel consumption per truck is eight gallons in 24 operating hours. This means that each truck consumes about 2,000 gallons of fuel per year. The 22 per cent differential between the cost of gasoline and LPG totals approximately $80 per unit, or about $560 for the fleet. "Actually, we take only 75 per cent of this when figuring our cost savings, to compensate for downtime, periods when the units are in service but are not actually running, and other contingencies," explains Mr. Levin. On this basis, then, the savings from the lowered fuel bill, in round numbers, amounts to $400 annually.

Sipi receives its LPG from a distributor located in suburban Skokie, about 15 miles away. Deliveries are made normally every other day. A total of 14 eight-gallon tanks are required for the seven tractors. Seven of the tanks are in use and the remainder are kept in reserve.

Refueling time has been cut appreciably. Formerly, to drive the vehicle to the gasoline pump for refueling required at least 15 minutes; with LPG the job is done in about half that time. When the LPG tank is nearly empty, it is removed in several simple steps. A valve is shut, a copper fuel line is uncoupled and the almost empty tank is lifted from the frame. Then, the filled tank is put in place, the process is reversed, and the tractor is ready to go back to work. The tank, when removed, is not quite empty, but the company pays only for the fuel it uses. This tank is put on a scale, the weight of the tank is subtracted, and the remainder (weight of the fuel inside) is converted into a credit on the firm's account with the distributor.

One of the big advantages of propane, Mr. Levin explained, is that it is about the cleanest motor fuel available. It vaporizes almost completely, leaving virtually no carbon or varnish on the walls of engine cylinders, which means that oil lasts longer and units can operate longer between overhauls.

Formerly, oil had to be changed once a week on each vehicle; now, the job is necessary only once every two months. Cost, excluding downtime and labor, comes to about $1.20 per vehicle, or about $8.50 for the fleet. The switch to LPG has reduced oil investment by about $400 a year.

When the vehicles were powered by gasoline, major engine overhauls were required on an average of every 60 days, at a cost of about $200 per unit, or $1,400 for the fleet. Now, the units run six months between overhauls. On an annual basis, the bill has been reduced from $8,400 to $5,600, a saving of $2,800. There have been substantial additional savings on such parts as spark plugs and oil filters. The former used to last two months, now they last six. Oil filters seldom lasted longer than a week; now, they stay in service at least a month.

The total saving on maintenance and fuel costs comes to about $3,600 annually. From this, the cost of conversion, $240 per vehicle, should be sub-

(Continued on page 230)

Mobile Command Post

Fully-Equipped Truck Provides Operating Base For Disaster Crews At Eastman Kodak

Fig. 1. Specially built truck can "set up shop" anywhere in plant, anytime

VERSATILITY of the fire-fighting and emergency organization at Eastman Kodak Co.'s Kodak Park Works has just been greatly increased with a new "mobile command post." The new unit is a specially-equipped panel truck capable of answering every fire alarm and major emergency alert at the plant.

Included in the truck's equipment are telephones, two-way radios, oxygen masks and supplies, medical litters and first aid cabinets. To further aid in directing the emergency crews, there are complete engineering drawings of the plant's more than a hundred major buildings and its miles of complex piping.

The plan for the new unit is that in cases of emergency it will proceed to a vantage point at the scene of the fire or disaster and from here the Director of Security and other key executives will set up a field command post to establish the scope and trend of the emergency. The direction of remedial operations will be done in the trucks.

The new unit fits into an overall Kodak Park security division made up of a committee of seven specialized groups embracing plant protection, security, medical, training, rescue, salvage, emergency, contamination and such related services. The coordinator of this committee is the Director of Security and is responsible for the general direction of operations at the emergency.

There is a medical staff which has available full-time and part-time doctors and nurses to evacuate the injured and give first aid. This group provides ambulance service, conducts first aid training and maintains liaison with the Red Cross and with local hospitals. The training unit plans evacuation and educates personnel in orderly procedures to avoid panic in case of disaster.

An emergency organization is in charge of the plant's fire brigades and conducts fire prevention and fire training drills. More than a thousand Kodak Park men and women, and special fire guards, have been trained, in classroom and field instruction.

The problems of a chemical and atomic age have made necessary the contamination unit, which is made up of chemists and physicists trained and experienced in various types of decontamination procedures and techniques.

The rescue and salvage group is made up of twelve task-force type units, representing skilled trades, each a specialist in making temporary or permanent repairs. For instance, one unit is organized with heavy equipment such as dump trucks, air compressors, bulldozers and a crane.

The new mobile command post is one more symbol of the plant's preparedness. Executives feel that the mobility of the new unit assures greater protection and security in the event of serious emergency or disaster, and makes it a very valuable addition to Kodak's regular program of plant and employee protection.

Fig. 2. Radio microphone, background, and oxygen rescue equipment are handy

Fig. 3. Fire department and disaster squad line vehicles up to show versatility. Second truck from right is new mobile command truck, third from left, new pumper

Eighteen plant engineers from industrial plants in Greensboro, Winston-Salem, Burlington and High Point, North Carolina, attended an informal dinner meeting on August 16 to discuss formation of Piedmont Plant Engineers' Society

32nd P. E. Society Organized

Reports from Other Plant Engineers' Societies

ANOTHER NAME has been added to the long list of Plant Engineers' Societies organized throughout the country. This is the Piedmont Chapter and a brief report of their first meeting along with comments from the other societies is mentioned below:

Piedmont

On August 16, eighteen plant engineers met in Greensboro, North Carolina, and organized the Piedmont Chapter of the American Institute of Plant Engineers. Those present were from industrial plants in Greensboro, Winston-Salem, Burlington and High Point, North Carolina.

Aubrey Tingen of Vick Chemical Co., sixth from left in front row, organized the group and was appointed temporary chairman. Jim Bartholomew, fourth from left in front row, of Monarch Elevator Co., will serve as secretary. L. F. Pultz of Western Electric Co. and H. Bodenheimer of Globe Parlor Furniture Co. were appointed to the Constitution Committee. The third member of this group will be Mr. Tingen.

Following is a list of the men who appear in the photograph on this page. From Greensboro: C. A. Tingen, Vick Chemical Co.; W. O. Ameen, Western Electric Co.; J. V. Isley, Burlington Mills; F. Carlson and J. H. Bartholomew of Monarch Elevator Co.

From Winston-Salem: L. L. Browning, R. J. Reynolds Tobacco Co.; M. H. Veach, W. J. O'Melia, H. A. Gardner, S. S. Sherrill, J. D. Hart, L. F. Pultz, R. P. Kennedy, and E. J. St. Amand, of Western Electric Co.; A. C. Shelton and S. L. Carter of P. H. Hanes Knitting Co.

From Burlington: M. T. Howell, Celanese Corporation of America. From High Point: H. Bodenheimer, Globe Parlor Furniture Co.

Richard H. Morris, Editorial Director, PLANT ENGINEERING, explained how the other plant engineers' groups were started and described some of their activities.

The second meeting of the organization was held Tuesday, September 27.

Detroit

At the last regular meeting of the Plant Engineers' Society of Detroit, the following slate of officers was elected for the 1955-1956 year:

B. J. Drummond, of Detroit Steel Products Co., was elected president; D. G. Philp, Bohn Aluminum & Brass Co., vice president; V. H. Chisholm, American Motors-Hudson, secretary; and J. P. Matte, Budd Company, treasurer.

F. P. Adams, Calumet & Hecla, Inc., will serve a two-year term as Board Member; R. A. Melton will serve a one-year term. An ex-officio Board Member is G. Breisch, Parke, Davis & Co.

Boston

As in the past, everyone had a good time at the annual outing of the Boston Plant Engineers' Club. During the afternoon many of the members and guests played golf or cards while others enjoyed visiting with each other and taking in the sights of the United Shoe Machinery Athletic Association Club, Beverly, Massachusetts.

During the afternoon the Entertainment Committee was kept busy receiving gifts from the members and arranging them for the after-dinner distribution.

In the evening the social period started with the usual supply of lobster tomalley to go along with liquid refreshment. After an excellent roast beef dinner, the gifts were distributed in addition to an auction period where a number of items were offered. The money collected from the auction was distributed to the Jimmy Fund and the Heart Fund.

New Jersey

New officers for the New Jersey Plant Engineers' Club for the 1955-1956 season will be:

G. Scheyer, Adamas Carbide Corp., who will serve as president; E. Peck, The Mengel Co., vice president; and N. Marchak, Sun Tube Corp., secretary-treasurer.

Board Members will be: H. Colman, Nopco Chemical Co.; D. W. Peterson, Continental Electrical Co.; and C. G. Matko, Reichhold Chemicals, Inc.

San Francisco

The Plant Engineers' Society of San Francisco elected the following members to the respective offices for the year 1955-1956:

L. J. Ghilardi, of Hall-Scott Motor Div., is the new president; C. B. Goff, Auto-Lite Battery Corp., secretary; and R. Pleski, Willys Motors Inc., treasurer. Member-at-large will be J. A. Panella of W. P. Fuller Co.

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For more facts circle 564 on Reply Card

Trailer-Housed Motormobile Takes Electric Motor Application Information Afield

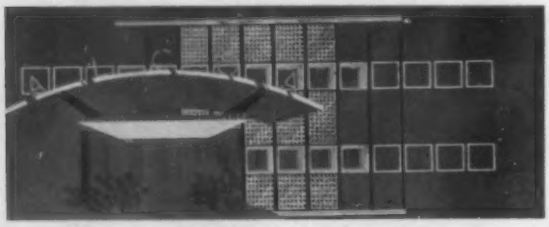
To GIVE ITS CUSTOMERS and prospects in-action demonstrations of products that are too unwieldy to carry in a briefcase, Howell Electric Motors Company has constructed a laboratory on wheels. A red and white trailer, towed by a pickup truck which houses a portable power generating unit, carries a show featuring motors operating under load.

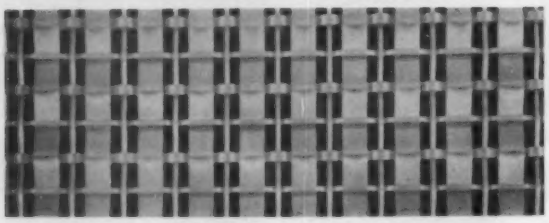
Highlighting the show are Howell's new design motors, built on NEMA rerated frames. Gearmotors, torque motors, brake motors and disc motors are among the units displayed. To present application possibilities, a lighted panel of installation photographs fills one end of the trailer.

Travel plans for the show provide for coverage of the Midwest, and Chicago's Production Engineering Show.

Decorative Grillwork Highlights Alcoa's New Building—and Its Products

A FUTURISTIC WALL DESIGN is to highlight a striking, two-story office building to be built in Atlanta, Ga., by Aluminum Company of America, to be the home of Alcoa's Atlanta sales force.





The front and rear of the building are to be overlayed with a gold aluminum mesh or grillwork, set against a blue background of aluminum curtain wall facing. The mesh, a weave of extruded aluminum bars and channels, will be composed of removable sections, suspended several inches from the structure's metal skin. One end of the structure is to be partially faced with a pattern of Georgia marble while the other will be blue aluminum.

Both the mesh and walls of the structure will feature Alcoa Architectural Colors, applied by an electrochemical process in which they are actually impregnated into the surface of the metal. The maintenance-free colors will neither chip, blister, nor rust.

Aluminum is to be used extensively. Natural-finish aluminum windows, enclosed in mechanically operated frames, will pivot vertically for cleaning from the inside. Among other aluminum installations, there are to be a basement aluminum cooling tower and an aluminum underfloor duct for telephone and electric outlets. All accessories and hardware are to be of the light metal — from handrailings and door knobs to venetian blinds and door treads.

Punched Cards Provide Another Means of Controlling Machine Tool Operations

PUNCHED BUSINESS MACHINE cards are controlling machine tools in a new system announced by the General Electric Company's Specialty Control Department. Called "Numerical Positioning Control", the system is adaptable for use on a wide variety of machine tools, including riveting machines, placement machines, milling, boring and drilling machines, punch presses, lathes and shears.

Punched holes in standard business machine cards are converted into positioning signals which direct the machine to the correct machining location, through a system of command and pick-up selsyns. As the first card is read, the machine positions itself accordingly, and the machining operation takes place. While this is transpiring, the next card is read and the machine moves to its next position. At the same time the machine is being positioned by the control, machine directions are also being read from the punched cards, which are conveyed to the machine to initiate coordinated action with positioning movements.

Standard card processing equipment is used for punching, sorting and stocking. Positioning information is punched into the cards in decimal form and is not coded, so the operator can read directions directly from the card. Each card contains complete information for at least one machining operation.

Once the cards are correctly punched and placed into the machine, the operator has only to push the start button and the machine automatically runs through the sequence of operations indicated, until the work piece is completed.

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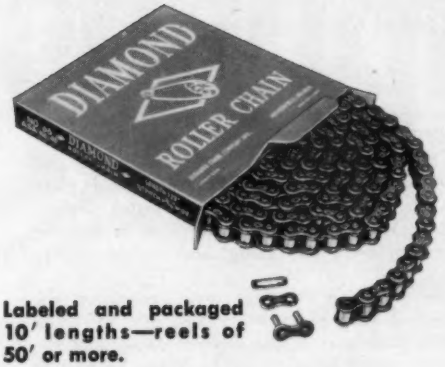

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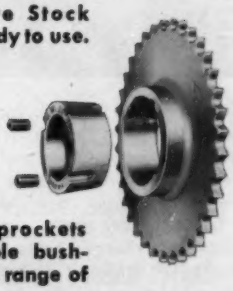

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Plant Designed For Growth By Future Addition of Five Identical Units

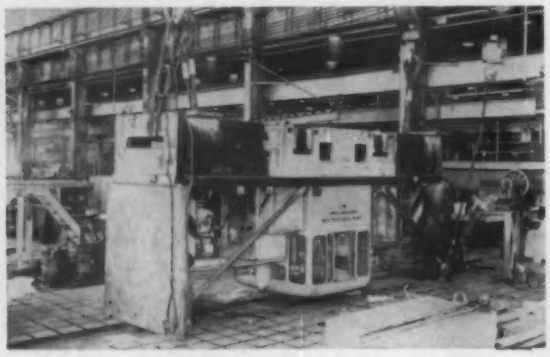
DESIGNED WITH REMOVABLE WALLS on two sides, a new plant has been opened by The Colson Corporation, Elyria, Ohio, manufacturers of casters, industrial materials handling equipment, and wheeled goods.

Measuring 400 ft long by 100 ft wide, the building is the first of six identical adjoining buildings planned. It is a one story, concrete and steel sash structure, designed so that the 400-ft long side walls can be removed when adjoining sections are constructed. This will afford completely open bays and parts of the removed walls will be used as the outside walls of the new structures. Ultimately, the plant dimensions will be 600 ft by 400 ft.

The new plant, like the adjoining plants to follow, has a high bay for receiving raw materials at one end and a finished product shipping bay at the other. The only two-story section of the building is the plant superintendent's office which has large windows affording a view of the entire operation. Sufficient electrical facilities and other utilities have been installed to accommodate this plant and one of the future adjoining plants.

Diesel-Electric Locomotive Turns Cartwheels in Repair Shop for Wheel Changes

AN ACROBATIC LOCOMOTIVE weighing 50 tons engaged in some industrial gymnastics at the General Electric Company's Locomotive and Car Equipment Department, Erie, Pa., as part of an overhauling operation.



Owned by the Vandergrift plant of the United States Steel Corporation, the industrial switcher had been originally built for operation on narrow gage track. Part of the overhaul consisted of converting it for operation on wide gage track.

G-E engineers decided that the easiest method to do this was to turn the locomotive completely up-side-down. This way, two-thirds of the equipment still inside the locomotive did not have to be removed.

To support the locomotive in its up-side-down position, which provided only the cab as a base, a steel plate was welded on each end of the frame. These plates, slightly higher than the cab roof, held the locomotive in position while the alteration work was being done on the undercarriage.

Used only for widening the gage of a locomotive, the method has proved very practical because the workmen can work on the underpart of the locomotive without the obstruction which would be encountered if the locomotive remained right-side-up.

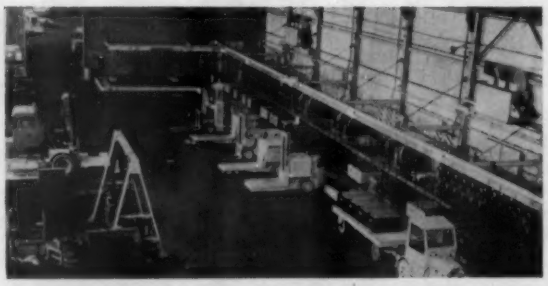
Battery Charging Station Has "Loan-Out" Service, Takes Battery to the User

SIXTY-FIVE ELECTRIC industrial trucks ranging in capacity from 4000 lb to 20,000 lb operate over 57 acres at Reynolds Metals Company's Aluminum Sheet and Plate Works, McCook, Ill., report engineers of Gould-National Batteries, Inc.

With 150 batteries to service for these trucks, a central battery charging and truck maintenance shop was laid out to achieve supervised charging and battery care. To reduce traveling time of trucks operating in areas distant from the battery shop, a tractor-trailer carries six charged batteries to a "substation" in the cast house, returning with discharged batteries on a schedule of five round trips in an eight-hour shift.

Battery racks are constructed of four steel I-beams, spaced 10 in. apart, on concrete bases raised about one foot above the floor. The beams permit circulation of air along their length, under the batteries, and also bring the tops of the batteries up to a convenient working height.

Glazed floor tiles are set in acid-resistant concrete under the batteries, with a slight incline built into the floor, to provide drainage for any spillage and for the water used to wash the batteries.



Several sizes of batteries are handled, including those used in 18 Autoettes in the plant, by an overhead crane that reaches all parts of the battery shop and truck repair depot. An adjustable spreader bar on the crane hook permits easy changing of the hook spread to accommodate any size of battery being handled. Five motor generators, each 75 KW, are arranged on two charge panels. The arrangement of charge circuits is flexible, easily modified by changing resistance taps and fuses on the charging panels.

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Big Refineries Burn Their Own Exhaust to Fire Waste-Heat Boilers

TWO CATALYTIC petroleum cracking plants, that feed on their own exhaust gases to supply the steam needed for their operation, have been placed on stream by the Sun Oil Co.

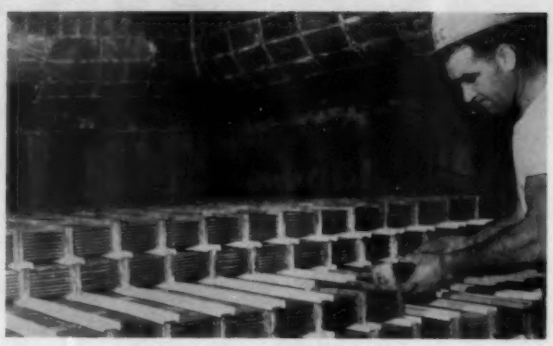
The two giant Houdriflow cat crackers, one each at Sun's Toledo, Ohio and Marcus Hook, Pa., refineries, make use of special catalytic waste-heat boilers to burn their own flue gases before they reach the atmosphere. In so doing, they generate a total of 100,000 lb of process steam per hour.

Sun's medium for cheap steam and low cost air pollution protection is an oxidation catalyst known to industry as Oxycat, manufactured by Oxy-Catalyst, Inc., Wayne, Pa.

Each of the more than 20,000 Oxycats installed in catalytic waste-heat boilers in the two plants is a brick-like structure consisting of 71 slender porcelain rods suspended between two square porcelain end-plates.

A thin catalytic coating on the rods oxidizes the carbon monoxide and hydrocarbon oil vapors in the cat cracker exhaust into a clean effluent of carbon dioxide and water vapor. The process is accompanied by a tremendous release of heat energy.

This release, a total of 110 million Btu per hour at the two plants, is the potential source of a $400,000 fuel saving each year. That represents the cost of the fuel that would be needed to supply steam to the cat crackers, without the waste-heat boilers.

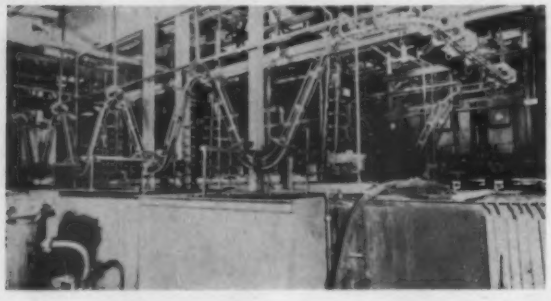


Sun uses the steam to drive turbines, which in turn drive the compressors which compress the air used for catalyst regeneration.

Short-Turn Linkage Conveyor Handles Parts in Dip-Tank Installation

SHARP DIPS and short turns are an unusual feature of a conveyor recently installed for the D. L. Auld Co., Columbus, Ohio, makers of metal emblems, name plates and similar parts.

Without traction wheels, sprockets or other cornering mechanisms, this Landahl conveyor provides both horizontal and vertical turns on a radius of only 12 in. Short vertical turns get parts in and out of a series of dip tanks only six feet long. Short horizontal turns avoid over-sized loops where parts shuttle through cleaning, drying and baking ovens.



This simplified turning action is facilitated by the conveyor's steel rod connectors, which replace the usual chain or cable linkage between trolley units. The rods pivot freely at both ends, in specially-hardened ball and socket joints. The ball element is secured to the ends of the connector rods; the sockets are openings in the ends of the trolley housings.

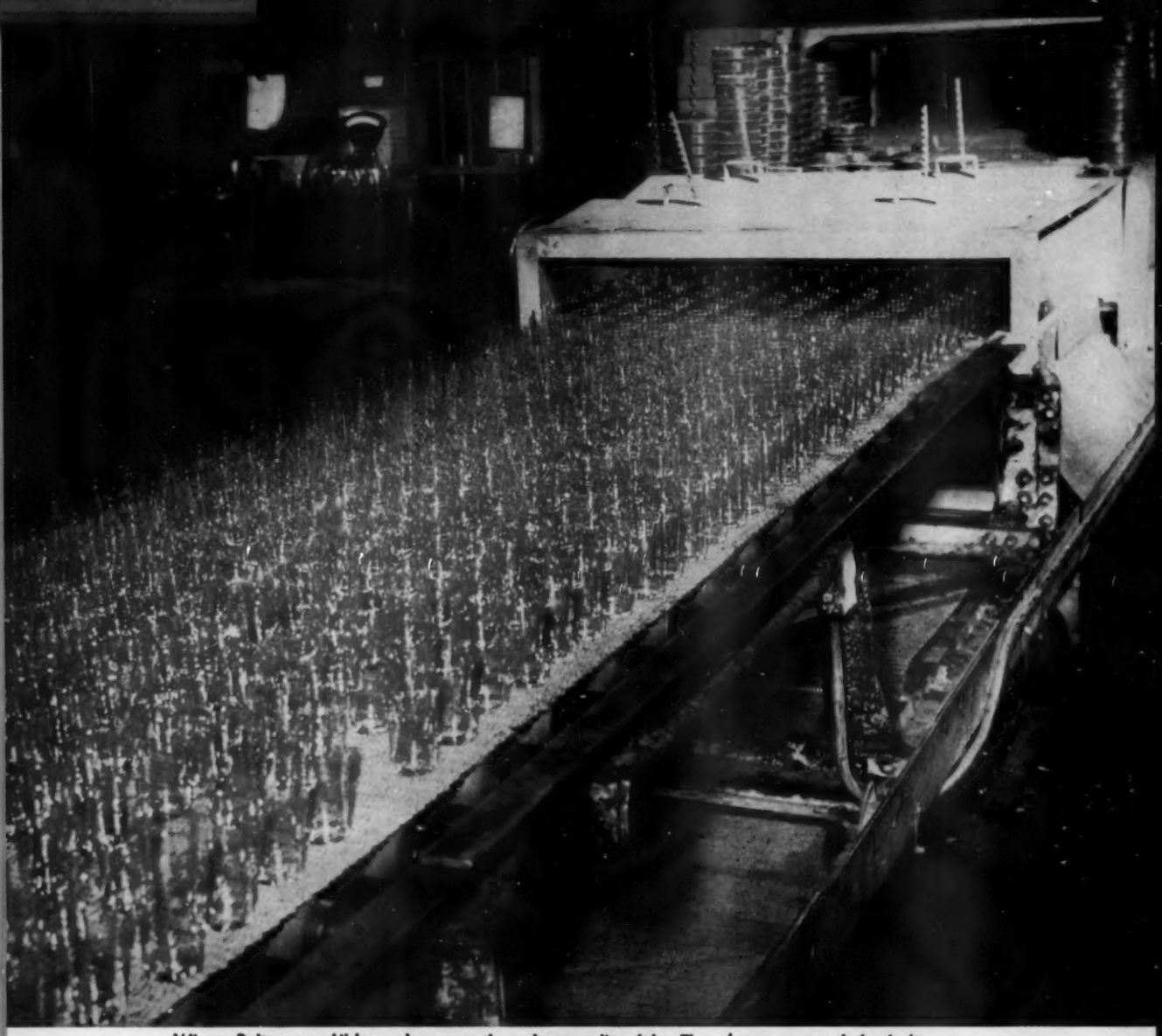
Trolley units, mounted at 12-in. intervals in this installation, consist of roller-skate wheels on individual axles, spaced evenly around a cylindrical center housing. They ride on angle iron tracks suspended by C-shaped steel plates. Two tracks are used for all straight horizontal travel; auxiliary tracks are mounted above wheels at turns.

Centralized Quality Control Laboratory Set Up By Container Manufacturer

COMPLETELY AIR CONDITIONED, a new quality control laboratory has been established by the Robert Gair Company at its Pennsylvania Corrugated Box Division in Philadelphia. It is designed to serve all 16 of the company's shipping container plants.

The air conditioning provides a controlled climate for the testing of the paperboard containers and paper samples. Relative humidity is maintained at 50 per cent and temperature is held at 73 F, both within close tolerances. To provide facilities for pre-conditioning containers and board samples prior to testing, one area of the laboratory is maintained at a relative humidity of 25 to 30 per cent.

In addition to a container compression tester, which measures the strength of a closed container held in compression, the laboratory also includes a tear tester, a puncture tester, rupture tester and a flat-crush tester. A tank has been provided for testing waterproof qualities of shipping containers manufactured for special service.



Wissco Belts carry Libbey glassware through annealing lehr. The glassware—and the belts—are subjected to elevated temperatures for approximately an hour. This is another example of how...

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Libbey Glass Division of Owens-Illinois

Libbey is a name that's well known for glassware of top quality. For its annealing operation, which helps insure this quality, Libbey purchased four Wissco Belts of thin, flat construction with improved lehr edge. High heat is applied at the beginning of the operation, and then gradually diminished. The glassware emerges at the cool end of the lehr with stresses and strains equalized. Wissco Alloy Processing Belts are the choice of many famous names in industry—leaders in their fields. You, too, will find Wissco the most economical and efficient belt for every processing operation—for metals, ceramics, glass annealing and decorating.

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2769

NEW PLANT CONSTRUCTION — advance information on location, costs

Santa Ana, Calif.—Byron Jackson Co., Patterson-Ballagh Division, 1900 E. 65th St., Los Angeles, Calif., has authorized plans for a new electronics plant in Santa Ana, Calif., on a 38 acre site recently acquired for that purpose. Plant will be twice the size of four Pasadena, Calif. locations now occupied by the electronics division, and will have an area of 100,000 sq ft of floor space. Work is to get under way soon at a reported cost of $1,500,000 for completion late in 1956.

Brunswick, Ga.—The Solvay Process Division of Allied Chemical & Dye Corp., 61 Broadway, New York, N. Y., alkalis and chemical products, has authorized plans for the construction of a chlorine and caustic soda plant on a 700 acre tract of land acquired for that purpose, near Brunswick, Ga. The plant is expected to be in production by December 1956 and will have a capacity of 100 tons of chlorine and 125 tons of caustic soda daily. No estimate of cost announced — reported to be in excess of $2,000,000.

Chicago, Ill.—Ford Motor Co., Dearborn, Michigan, has authorized plans for a new stamping plant to be located on the southwest corner of Lincoln Highway and Cottage Grove Avenue, E. Chicago Heights, Ill. Steel building will be one story, metal and composition siding and will have a floor area of 1,500,000 sq ft. Plant will cost in excess of $25,000,000 including equipment. Architect: Smith, Hinchman & Grylles, Detroit, Mich.

Chicago, Ill.—Rheem Mfg. Co., 570 Lexington Avenue, New York, N. Y., Containers, automatic water heaters, ranges and warm air circulating heating equipment, has announced plans for company expansion at Chicago plant located at 76th St. and Kedzie Ave., Addition will be one story of brick and steel construction. Expansion and new equipment will greatly enlarge plant capacity and is reported to cost in excess of $1,000,000.

Chicago, Ill.—Clearing Machine Corp., 6499 W. 65th St., Chicago, Ill., presses and pneumatic forming presses, has announced plans for a major expansion at local plant to cost in excess of $3,000,000. New plant addition of 61,000 sq ft of floor area is planned to house five 75 ton capacity overhead cranes to handle weldments fabricated there. Company plans to buy new milling machines and other machine tool equipment and new facilities are scheduled to be in operation early in 1956.

East Chicago, Ind.—Youngstown Sheet & Tube Co., 1954 Stambaugh Bldg., Youngstown, O., has announced plans for the installation of a new battery of 75 coke ovens at its Indiana Harbor Works, East Chicago, Ind. The site for the new coke battery is now being cleared and is expected to be in operation by September 1956. The ovens will consume 1,800 tons of coal daily, producing about 1,250 tons of coke daily or approximately 450,000 tons a year. Cost of the new installation, the third since May, was not disclosed, but outside estimates are between $8,000,000 and $10,000,000 before completion.

Ligonier, Ind.—Iron Fireman Manufacturing Co., 3239 W. 106th St., Cleveland, Ohio, has announced plans for the sixth production facility of the company at local site. The one story structure will have an area of 132,000 sq ft of floor space and will allow for construction of additional wings for future expansion. Construction is scheduled to start soon for completion in early 1956. The plant when completed will turn out oil, gas and coal heating and power equipment, electrical and electronic products and aircraft component parts. Entire project to cost approximately $1,000,000.

Cedar Rapids, Iowa—Allis - Chalmers Manufacturing Co., 1954 Thomas St., Milwaukee, Wis., has plans under way for the expansion of its shops, offices and equipment at its Cedar Rapids, Iowa, works for the manufacture of motorized scrapers and wagons. Work will begin at once for increased capacity and is expected to be completed early in 1956 when several hundred employees will be added. Expansion of plant and equipment will represent an investment in excess of $1,800,000.

New Brunswick, N. J.—Johnson & Johnson, 1940 George Street, New Brunswick, N. J., has announced the purchase of a 275 acre site in North Brunswick Township for the erection of a plant for the manufacture of surgical dressings and baby products. Clearing of the large tract is under way with construction work scheduled for early December. Completion of the new unit is scheduled for September of 1956. No estimate of cost announced — reported to be in excess of $2,000,000.

Trenton, N. J.—National Automotive Fibres, Inc., 19,925 Hoover Ave., Detroit, Mich., has plans maturing for new plant and equipment at its Trenton, N. J. division. Authorized construction of an addition to present plant of 75,000 sq ft of floor space will double plant area and will provide increased production of rubber and synthetic products for the automotive and apparel industries. Cost of expansion estimated in excess of $1,200,000 and is expected to be in full operation by early 1956.

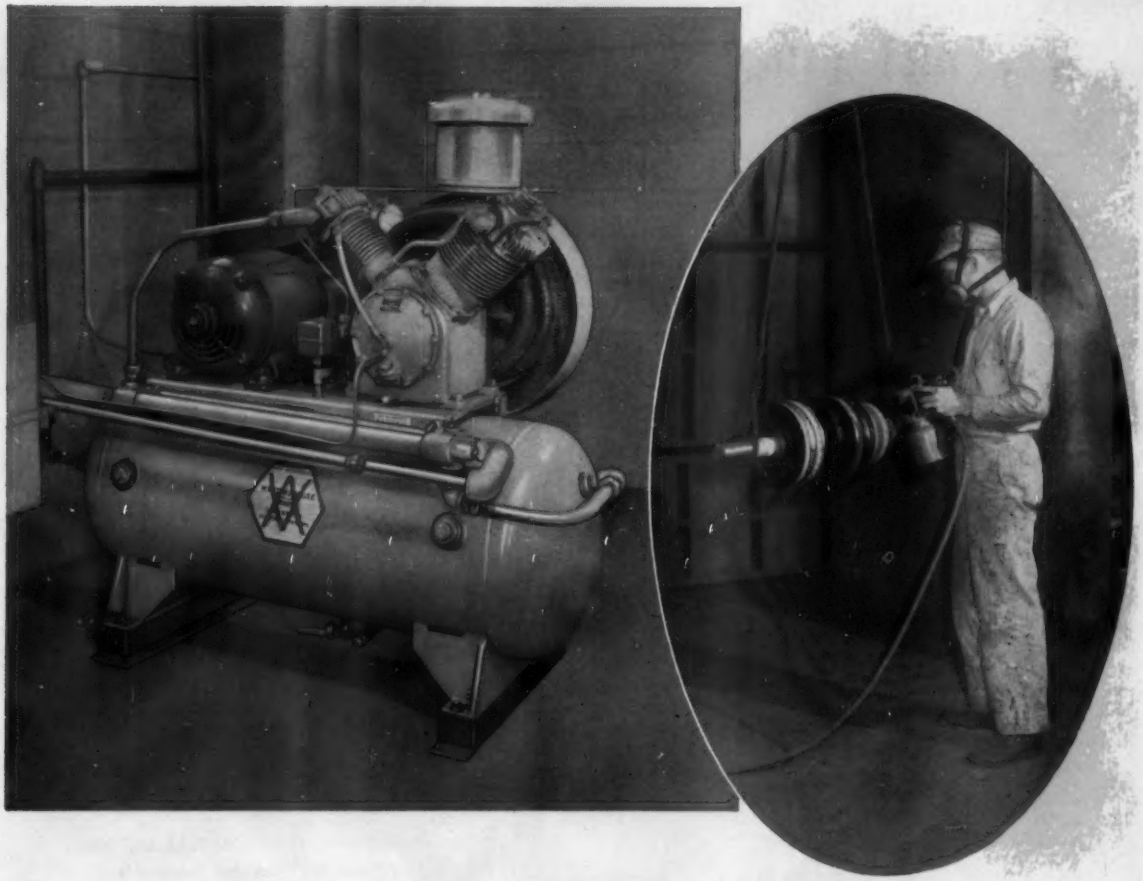
Carlsbad, N. M.—United States Potash Co., 30 Rockefeller Plaza, New York, N.Y., will begin work soon on an expansion program of refining facilities to provide approximately 20 per cent additional productive capacity at potash mines near Carlsbad, New Mexico. It is expected that additional production will be available for the 1956-1957 sales year which begins June 1, 1956. Project will represent an investment of $3,000,000.

Cleveland, Ohio—Thompson Products, Inc., 23555 Euclid Avenue, Euclid 17, O., manufacturers of automotive, aircraft, electronic and general industrial parts and components will carry out an expansion program on recently acquired plant formerly occupied by White Motor Co. Plant addition of 130,000 sq ft will be erected to the new facility of 370,000 sq ft. The valve division plant will employ 2,500 persons in the production of valves for automobiles, trucks, tractors, stationary engines and aircraft. Cost is estimated at well over $1,000,000.

Lititz, Pa.—Warner-Lambert Pharmaceutical Co., Inc., 113 W. 18th St., New York, N. Y., has authorized plans for the construction of a new cosmetic and toiletry manufacturing plant at local site. Work will consist of two and three story buildings, air-conditioned and especially designed for cosmetics manufacturing. Plant is expected to be completed by June 1956 with initial production scheduled for September. No estimate of cost announced — will represent an investment of several million dollars.

Harleyville, S. C.—Giant Portland Cement Co., Architects Bldg., Philadelphia, Pa., has authorized plans for the expansion of its cement plant at Harleyville, S. C. by at least 60 per cent. The expansion will increase cement production from 1,800,000 bbl a year to 3,000,000 bbl. Company has acquired 600 more acres of land adjoining its plant to provide sufficient raw material for the many years ahead. Cost reported to be in the neighborhood of $4,000,000.

Houston, Texas—Texas Butadiene & Chemical Corp., Mellie Esperson Bldg., Houston, Texas, has announced plans for the erection of an alkylate-avgas and butadiene plant in this area for the production of finished aviation gasoline, or alternately, alkylates for blending into commercial motor fuels and butylenes. At the same time it will produce butadiene for synthetic rubber, nylon and other end products. Anticipated capacity of the plant range from 2,500,000 bbl of avgas with 17,000 tons of butadiene, to diminishing quantities of avgas and increasing quantities of butadiene to 43,000 tons. Estimated date for completion December 1956 at an estimated cost of $26,000,000.



Paint a Brighter Profit Picture

...use the flexibility of air to cut costs in your plant, and Westinghouse Air Compressors to cut the cost of your air

Spray painting, drilling, bolting, grinding, punch press operation — there are countless ways that the flexibility of air power cuts costs, improves profits.

Because air power is so useful, it is important to have a dependable supply — important to have a Westinghouse Compressor.

Only Westinghouse can give you all 15 of these features: Type M inlet filter, disc valves, enclosed crankcase, anti-friction main bearings, pressure lubrication, low oil level protection, enclosed starting unloader, adequate cooling fins, "Y" type construction, high velocity flywheel fan, large size intercooler, thermal overload protection, greater weight, dual control, and one-year warranty period.

So paint a brighter profit picture. Use air power and get it at its low-cost best from a Westinghouse Air Compressor. Sizes up to 40 horsepower. Write for details.

LE ROI *Division of Westinghouse Air Brake Co.*

Milwaukee 14, Wisconsin

PORTABLE AIR COMPRESSORS • TRACTAIR • STATIONARY AIR COMPRESSORS • ENGINES • AIR TOOLS

Distributors in all principal cities

For more facts circle 568 on Reply Card

75,000-gal. Horton elevated water tank at Gerber Products, Inc., Rochester, N. Y.

UNIQUE HORTON WATER TANK AT GERBER'S

It would be hard to measure the publicity value of the special Horton® water tank shown at the left, built for Gerber Products Inc. at Rochester, New York. A replica of the nationally known Gerber Baby Foods jar, it towers above the surrounding area.

This unique water tank provides a dependable, gravity pressure water supply that is always available—with the automatic plant sprinkler system, it provides maximum fire protection.

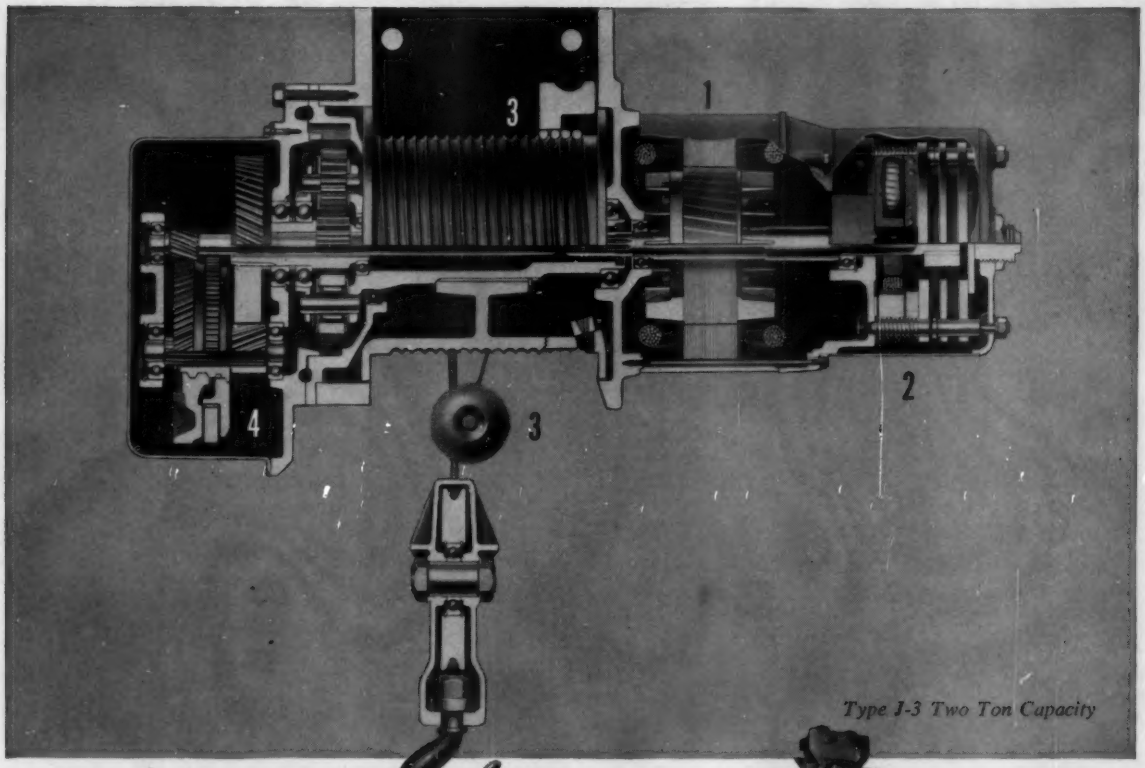
Investment wise, the water tank and plant sprinkler system will pay for themselves in approximately five years through reduced insurance premiums.

Write our nearest office for information on Horton elevated tanks of standard or unique design.

CBI

Chicago Bridge & Iron Company

Atlanta • Birmingham • Boston • Chicago • Cleveland • Detroit • Houston
Los Angeles • New York • Philadelphia • Pittsburgh • Salt Lake City
San Francisco • Seattle • Tulsa
Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY and GREENVILLE, PA.



Type J-3 Two Ton Capacity

BIGGER LOADS: FASTER PACE

A JOB FOR THE J-3: While today's bulk loads often weigh more—by 25% to 50%—they must be lifted, moved, and spotted more quickly than yesterday's. This is a job for Robbins & Myers J-3 two-ton electric hoists, which meet these conditions, offering long life, high performance, low operating cost—and at low first cost:

1. MOTOR	2 HP Robbins & Myers, fully enclosed, 30-minute heavy duty rating—built exclusively for hoist duty.
2. MOTOR BRAKE	Oversize, magnetic disc type—stops load without drift.
3. LIMIT SWITCHES	Upper and lower—positively prevent over-travel of block for extra safety, lower limit switch stops hoist with two wraps of cable still snubbed on the drum.
4. LOAD BRAKE	Self-adjusting, Weston type—operates in oil bath.

Other R & M Hoists and Cranes available in ratings from 500 to 20,000 pounds.

Bring your R & M hoist data files up to date. Send for free bulletin.

☐ Send Bulletin No. 890 ☐ Have Representative call

VENTILATORS | MOYNO PUMPS | HOISTS CRANES | MOTORS | FANS

ROBBINS & MYERS INC.

SPRINGFIELD, OHIO | BRANTFORD, ONTARIO

For more facts circle 570 on Reply Card

No costly maintenance problem here

Clean, trim-looking Johns-Manville Corrugated Transite side walls will provide years of maintenance-free service for Grinnell Company of the Pacific. Architect: Richard Sundeleaf, Portland, Oregon; General Contractor: Henry M. Mason Company, Portland, Oregon; Transite Erector: The E. J. Bartells Company, Portland, Oregon.

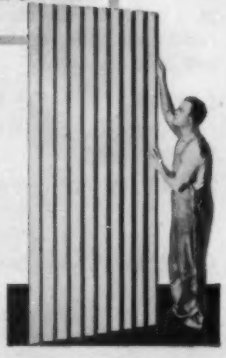
build with Johns-Manville Corrugated Asbestos Transite

For maintenance-free exterior walls and roofs, plus protection from fire, rot and weather

YOU SAVE MONEY on construction and maintenance when you build with Johns-Manville Corrugated Transite®. Corrugated Transite comes in large sheets that require a minimum of framing . . . permits fast economical construction of industrial, commercial, institutional and agricultural buildings.

Made of asbestos and cement, Corrugated Transite is practically indestructible. It never needs paint or special treatment to preserve it . . . it's fireproof and rotproof. Corrugated Transite is also used increasingly for interiors. The streamlined corrugations and attractive shadow lines offer interesting design possibilities.

Investigate Johns-Manville Corrugated Asbestos Transite and learn how you can build quickly and easily . . . have an attractive, long-lasting, trouble-free structure regardless of size or purpose. For complete details write Johns-Manville, Box 158, Dept. PE, New York 16, New York. In Canada, write 565 Lakeshore Road East, Port Credit, Ontario.



- Large sheets go up quickly
- Easy to fasten to steel
- Easy to nail to wood
- Easy to saw
- Easy to drill

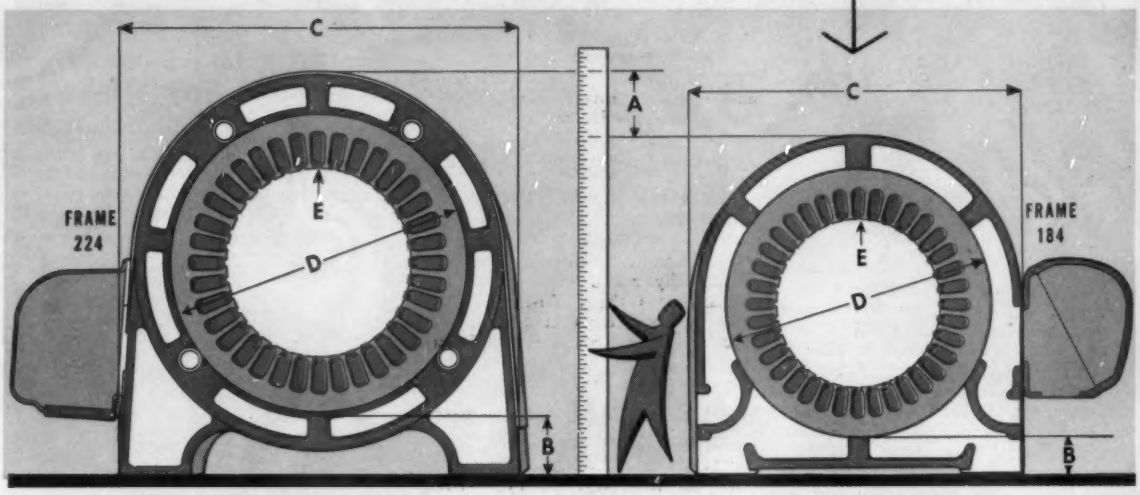
See "MEET THE PRESS" on NBC-TV, sponsored on alternate Sundays by Johns-Manville

JOHNS-MANVILLE JM PRODUCTS **Johns-Manville**

For more facts circle 571 on Reply Card

THE NEW U.S. UNICLOSED MOTOR

*saves 46% in space**



COMPARISON

A — Over-all height reduced
B — Stator closer to mounting surface
C — Over-all width reduced
D — Approx. same punching O. D.
E — Same number of slots

* EXAMPLE—
2 h.p., 4-pole
Previous 224 Frame—
1663 cu. in.
New 184 Frame—
891 cu. in.
SAVING—
772 cu. in.
or 46%

More Horsepower per cubic inch

Saving in space of 46% for the 2 h.p. size, in comparison with previous NEMA dimensions, is typical of the ratings in the new U. S. Type H Uniclosed motor. Improvement of insulation, advanced electrical design, closer tolerances, all contribute to development of maximum horsepower within the least cubical space. Many other exclusive U. S. features, such as asbestos-protected windings, Lubriflush transverse lubrication, solid cast-iron frame and normalized castings, also add longer life and more efficient power.

Mail Coupon for informative full-color 12-page Type H Bulletin

U. S. ELECTRICAL MOTORS, INC. PLE-10
P.O. Box 2058, Los Angeles 54, Calif., or
Milford, Conn. Send Type H Bulletin No. F-1856

NAME _____

COMPANY _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

For more facts circle 572 on Reply Card

NEW PRODUCTS AND PROCESSES summarized for your convenience

Edited by M. E. Heniken

Use the Reader Service Cards provided on pages 235-236 to ask for more information on these products. Circle item numbers of products in which you are interested.

1—MOTOR MOUNT is "harness for horsepower"

Designed to provide a quick and dependable way of harnessing fractional horsepower motors and small gasoline engines, Freeman Universal Motor Mount Model 20 comes in three sizes. Pulleys

can be quickly aligned, and belt tension adjusted, manufacturer points out, or tools can be attached for direct drive. It eliminates necessity of locating and drilling holes in work benches. Mount permits two-way movement of motor, and motor can be used to pump water, saw wood, operate paint sprayers, sanders, tool sharpeners, air compressors, battery chargers, power tools. Available in slate gray and maroon finish, the mount has all-steel construction, yet is lightweight and sturdy. Arco Mfg. Co.

2—DRAFTING TEMPLATE for drawing squares quickly

With the Slide-A-Square Template 440, any size square from 0 to 3 in. can be drawn quickly and accurately by an adjustment of the slider, it is announced. It has three scales: decimal inches, fractional inches and metric system. According to manufacturer, a feature of the template is that the length of the diagonal of the squares is automatically computed and indicated by a pointer. It is made of rigid vinyl plastic. E-Z-Way Templates.

3—PORTABLE HEATER can be lifted easily or wheeled

The Master B-100 Portable Heater is announced as a small, lightweight (78 lb without fuel) furnace on wheels which can be lifted or wheeled easily by one man to wherever it's needed. Workmen can use it on scaffolds, or carry it down

steep stairs and through places too small for most heaters. Low-priced, the heater is said to operate at 12 cents per hr. The B-100 is extra-powerful for its small size, company points out; it has a 100,000 Btu per hr capacity, with ¼ hp combined fan and pump motor that blows 500 cfm of warm air. It has a 12 hr fuel capacity. The unit runs from regular 110-115 v, 60 cycle a-c current and burns kerosene or No. 1 or 2 fuel oil. Because there are no dangerous fumes, company says, no vent is needed. Automatic ignition turns on with flip of a switch. Master Vibrator Co.

4—RECHARGEABLE FLASHLIGHT is a thrifty one

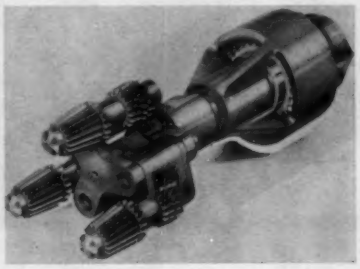
The Multi-Lite Flashlight can be recharged over 250 times, company says, using the same nickel-cadmium battery. Hermetically sealed in a rugged case, company says the Multi-Lite will cut down flashlight costs in truck maintenance and battery-room. Gould-National Batteries, Inc.

5—DUST COLLECTOR is packaged type unit

For plants where dust control and removal are necessary, the Type G.W.F. Aerodyne is complete within itself, consisting of a louvered cone and one or more fiber filter packs in series. The cone removes from the air or gas, the coarser and medium particles; the filter packs are designed to remove submicron particles and many undesirable condensable elements. The unit is available in capacities from 1000 to 10,000 cfm free air. It is compact in size—the 1000 cfm unit is only 3 by 3 by 7 ft. Power requirements range from 1½ to 15 hp with the motor assembled with the unit. The Green Fuel Economizer Co.

6—MOTOR, for tube cleaners, is water driven

This ball-bearing water-driven motor is suggested for plants where air and steam are not available for operating tube cleaning equipment. In certain industries, the water-driven motor will be more practical to use, company points out, as it is a cleaner operation than using air or



steam. The motor is designed for use with either high or low pressure. Manufacturer says it will operate on far less pressure than previous models, and is 75 per cent more powerful.

In design this motor and its cleaning or expansion head are shorter than other types, making it adapted for work in curved as well as straight tubes. It can be used in tubes of 1¼ to 4 in. ID. It costs less than steam- or air-driven models. The Airetool Mfg. Co.

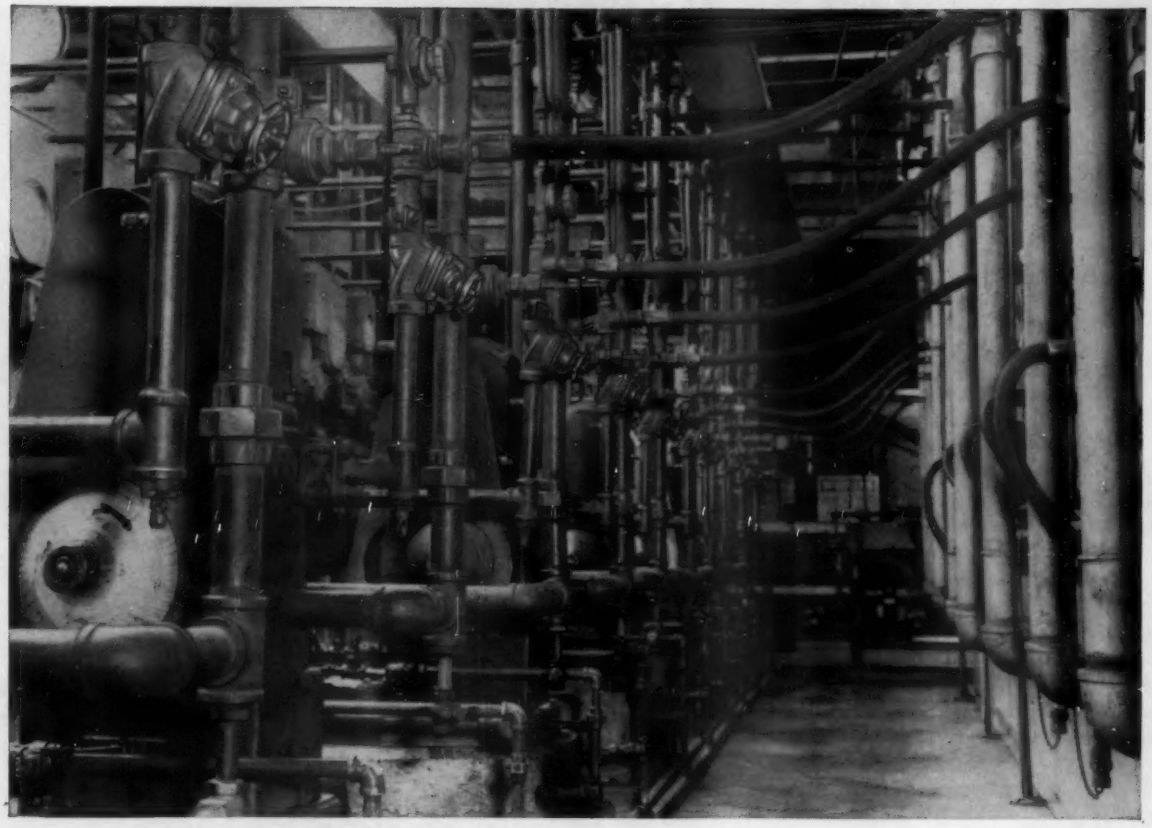
7—ELECTRICAL PROTECTOR copes with the high short circuits

Announced as a new concept in low voltage circuit breaker design providing short circuit protection up to 100,000 rms amp, the Cordon Circuit Breaker weds a current-limiting device to a standard molded-case circuit breaker—both in a housing only a few inches longer than a standard breaker of comparable size. This, it is stated, provides a compact electrical protector with a high short circuit interrupting capacity and operational advantages of a circuit breaker.

Available 600-v molded case circuit breakers have maximum current interrupting ratings of 25,000 amp, it is pointed out. Yet, due to increased distribution voltages and higher concentration of power in low voltage distribution systems, available short circuit currents of 100,000 rms amp are not uncommon.

This unit incorporates a trip arrangement which houses current limiting fuses to extend the interrupting rating. The standard circuit breaker section contains the conventional thermal trip (for minor overloads) and instantaneous magnetic trip (for faults below extreme short circuit currents). Thus, company points out, repetitive action is retained and replacement need be made only after major short circuit faults exceeding normal interrupting rating of the standard breaker. The current limiting fuses are designed to assume fault clearing duty from the thermal and magnetic trips at 80 per cent of the interrupting rating of the breaking section (at 20,000 amp for a 25,000 amp rated circuit breaker).

The compact fuse element used is called the Amp-trap (made by Chase-Shawmut Co.). Its current limiting char-



Holding high vacuum with low upkeep is routine for these CRANE VALVES

At the Crosley & Bendix Home Appliance Divs., Avco Mfg. Corp. refrigerator plant at Richmond, Ind., a line vacuum within a few microns of absolute is applied to a dehydration process. But holding this vacuum wasn't always a routine operation.

There was a time when frequent valve failures caused production losses and costly maintenance—stopped only when Crane Packless Diaphragm Valves were installed.

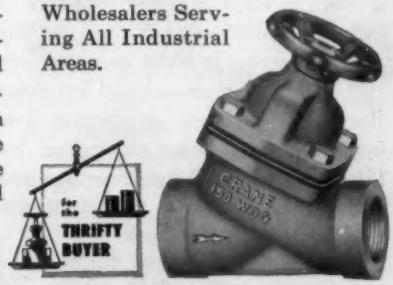
Of the valves formerly used, a multiple metal diaphragm type lasted about 3 months. Crowning of diaphragms caused restriction or closure and made the valves inoperable. Damaged diaphragms meant complete valve replacements.

In other valves, in-leakage at the diaphragm-to-stem connection made them unsatisfactory.

Now in service more than a year, none of the Crane Kel-F Diaphragm Valves has needed any maintenance. Crane simplified construction, giving a longer-life diaphragm... tighter bonnet seal and seating . . . and easier operation . . . is the reason.

The diaphragm in Crane design has longer life because it seals the bonnet only—is not subject to the cutting and crushing encountered when also used for seating. The separate, positive seating disc controls fluid even should diaphragm fail. Wide selection of body materials and trims. Ask your Crane Representative for Circular AD-1942.

Crane Co., General Offices: 836 S. Michigan Ave., Chicago 5, Ill. Branches and Wholesalers Serving All Industrial Areas.



CRANE CO.

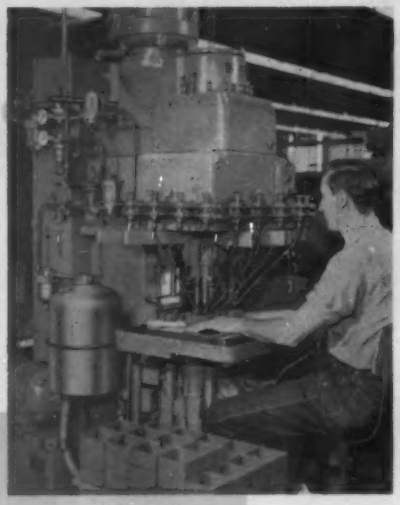
VALVES • FITTINGS • PIPE
KITCHENS • PLUMBING • HEATING

CRANE'S FIRST CENTURY...1855-1955

For more facts circle 573 on Reply Card

Norgren Spray-Lube System as applied by Square D Co.

to multiple tapping operation, speeds production 30%



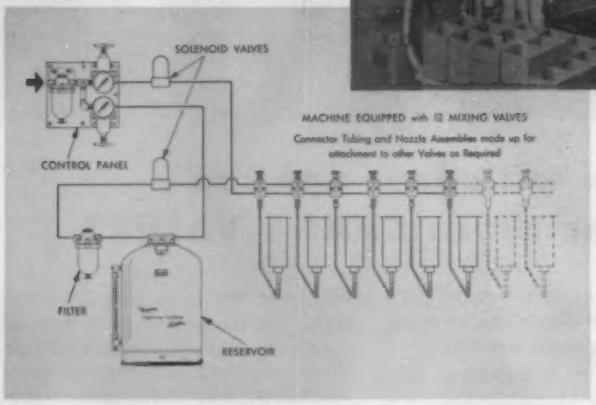
and in addition:

eliminates time and labor formerly required for draining and wiping tapped parts

relieves one man for more productive work

elimination of flood system greatly improves working conditions

substantial saving in lubricant


SOLENOID VALVES
MACHINE EQUIPPED with 12 MIXING VALVES
Connector Tubing and Nozzle Assemblies made up for attachment to other Valves as Required
CONTROL PANEL
FILTER
RESERVOIR

This tapping machine in the Square D Company production line handles a wide variety of tapping operations requiring as many as 12 taps in simultaneous operation. On job shown, tapping 3 holes in each of 2 switchbox covers, Norgren Spray-Lube System increased production 30%... eliminated the cleaning process. Even greater increases were reported on other jobs.

The unpleasant and hazardous disadvantages of the previous flood system, splashing lubricant over the operator and the surrounding floor, has been eliminated by Spray-Lube. Lubricant saving (Stanicut No. 107) has been substantial. Solenoid valves permit the Spray-Lube System to be actuated only when taps are approaching and contacting the work.

C. A. Norgren CO. 3443 So. Elati, Englewood, Colo.

For complete data on this Norgren Spray-Lube application write for Blueprint SL 5 or phone the Norgren representative listed in your telephone directory classified section under Norgren Pneumatic Products.

For more facts circle 574 on Reply Card

NEW PRODUCTS

(Begins on page 152)

acteristic lets the breaker withstand the shock of a heavy fault. The Amp-trap runs cool under rated current load and thus does not affect operation of the thermal trip of the breaker.

According to company, mechanical interconnection between Amp-trap unit and circuit breaker makes it impossible to damage electrical equipment by operating on two phases when the third phase faults to ground. Each Amp-trap contains a spring-loaded plunger that is released when the Amp-trap fuses. The plunger actuates the breaker trip mechanism to open all three phases. This feature makes it impossible to reset the circuit breaker without replacing the blown Amp-trap, it is explained; and it eliminates the danger of removing fuses under load, as the mechanical linkage will trip the breaker before the Amp-trap unit contacts are broken.

The time required to reset a Cordon Circuit Breaker indicates the magnitude of the fault current. In case of a minor overload, the thermal element will open the breaker — and you will have to allow the bi-metal to cool before being able to reset the breaker. If the fault is a major overload, yet less than 80 per cent of the standard circuit breaker interrupting rating, you can reset the magnetic trip immediately. But with a high short circuit current, you cannot reset the breaker until the blown Amp-traps are replaced. The Cordon Circuit Breaker, for voltages up to 480 v a-c, three-phase or 250 v d-c, will come in four frame sizes with continuous current ratings of 100, 225, 400 and 600 amp. I-T-E Circuit Breaker Co.

8—CONVEYOR PULLEY designed for food handling

Developed especially for the food field, the Sanitized Pulley is announced as a strong steel pulley completely enclosed in a molded cover of specially formulated plastic. Plastic coating is 5/16 in. thick and is bonded to the steel pulley. There is no exposed metal, other than the stainless steel shaft, with no cracks or crevices to permit contamination or bacteria build-up. Pulley is easy to clean with steam or hot water, company says; it cannot corrode and is highly resistant to acids, oils, alkalies and greases. It is claimed tough, water-proof, odorless and non-toxic. Mercury Industries, Inc.

9—CONTROL PILOT regulates pressure, temperature

Standard Type 51 pilot is said to provide extremely accurate and dependable control of pressure and temperature. The pilot is applicable for pressure ranges from 0-15 to 0-10,000 psi, and 0-30 in. H_20 and 0-30 in. Hg vacuum. Pressure-sensing elements are available in phosphor bronze, beryllium copper or stainless steel. Temperature ranges from -40 F to 1000 F, with mercury-actuated ar-

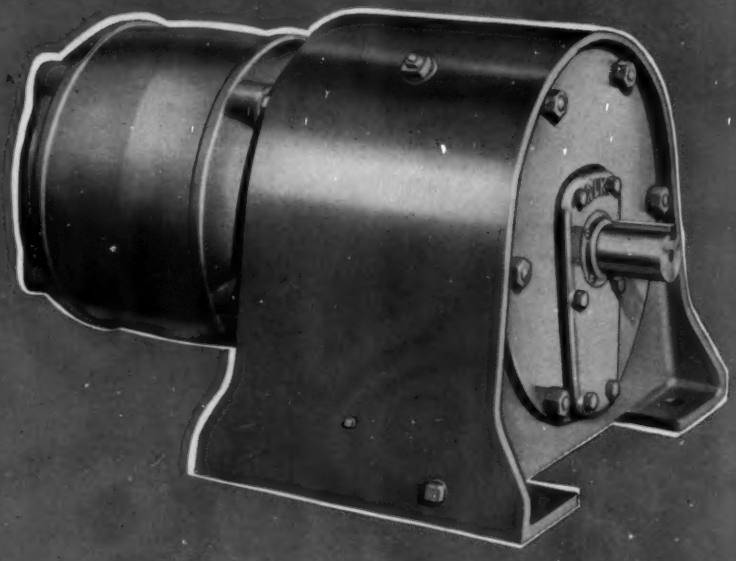
For more facts circle 575 on Reply Card ⟶

Announcing the *–Newly Designed–* Integral

ALL-STEEL FALK Motoreducer

(Gearmotor Type–Supplementing Falk All-Motor Line)

. . . with completely standard round-frame, D-flange motor



Check and Compare these features...

Meet a faithful old friend in a new, modern dress! The famous, time-proved Integral Type *all-steel* Falk Motoreducer (Supplementing Falk All-Motor Line) has been redesigned into a compact, streamlined unit providing the utmost in space economy—but retaining all the application versatility, long-life performance, easy-maintenance features and superior structural qualities that have made Falk Motoreducers the recognized standard throughout industry.

In this new Integral unit—rated in accordance with AGMA standards—a *completely standard* round-frame, D flange NEMA motor is mounted directly on the all-steel Motoreducer housing. The motor remains a separate piece of equipment, readily replaceable with any other type or make. Output speed (ratio) can be changed within unit's torque capacity without modifying motor. Size and arrangement of the standard housing permit wide ratio range—from 3.36:1 to 542:1.

In order to meet the greatest number of industrial application needs, the newly designed Integral Motoreducers are available in horizontal and vertical models, both in concentric and right-angle types; double, triple and quadruple reduction; horsepower range, 1 to 40 HP. Prompt stock shipment in standard ratios is offered.

Whatever your reduction requirements, you get greatest dollar-for-dollar value in the long run by standardizing on Falk products. Write for Bulletin 3104.

Every FALK Motoreducer has these "In-built" Factors—

Precision Gearing. Heat treated alloy steel, precision cut and shaved helical gearing throughout . . . quiet-operating crown shaved pinions . . . taper bored gears for easy ratio changes.

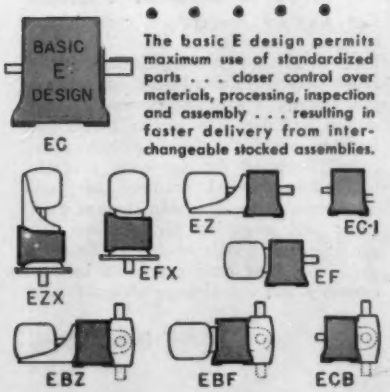
All-steel Housings. Unbreakable, strong, rigid. Generous overhung load capacities provided by wide bearing spans, large shafts and bearings.

Streamlined inside and outside. Smooth, clean surfaces; machine welded construction conforms to NEMA motor frames.

Positive Lubrication. Large sump capacity . . . oil-tight construction assures clean lubricant . . . direct dip of revolving elements provides positive lubrication at all speeds.

Wide Speed Range. Selective ratio combinations provide output speeds from 1.5 rpm to 1430 rpm with stock gears.

Sealed Housings. Dual closures and one-way vents keep oil *in*, dust and moisture *out*. Units are splash-proof, leakproof, dustproof.



The basic E design permits maximum use of standardized parts . . . closer control over materials, processing, inspection and assembly . . . resulting in faster delivery from interchangeable stocked assemblies.

FALK ...a good name in industry

THE FALK CORPORATION · 3001 W. Canal St. · Milwaukee 8, Wis.

WRITE FOR BULLETIN 3104

Geared TO MEET INDUSTRIES' DEMAND FOR HIGH QUALITY CONVEYING MACHINERY

New office and engineering building, completed early in 1955. Part of an extensive program of expansion of the engineering and manufacturing facilities at the Ellwood City, Pennsylvania, plant.

Whatever the conveying problem might be — whether it involves the handling of a few pounds or many tons —**Mathews** builds the equipment to do the job. You can be sure of this service, from proposition through installation, when you buy **Mathews Conveyers.** And, of course, you get the benefit of **fifty years' experience** in continuous flow material handling.

50th Anniversary MATHEWS CONVEYERS 1905-1955

GENERAL OFFICES . . . . ELLWOOD CITY, PENNSYLVANIA
PACIFIC COAST DIV., MATHEWS CONVEYER COMPANY WEST COAST, SAN CARLOS, CALIFORNIA
CANADIAN DIVISION . . MATHEWS CONVEYER COMPANY, LTD. PORT HOPE, ONTARIO

Engineering Offices or Sales Agencies in Principal American and Canadian Cities
Export Representative—Foreign Trade Division of New York Hanseatic Corporation

MATHEWS

For more facts circle 576 on Reply Card

NEW PRODUCTS

(Begins on page 152)

mored capillary temperature-sensing element available with plain bulb, union connection or union connection with separable socket. Other features are incorporation of process pressure or temperature gage in pilot; calibrated set point adjustment; unit construction; feedback proportional control, with 1 to 100 per cent proportional band and differential gap; availability with proportional, plus automatic reset action; all-metal, frictionless power relay incorporating jewel nozzle feed orifice with pushbutton cleaner. Pilot can be had separately or mounted on control valve. A. W. Cash Co.

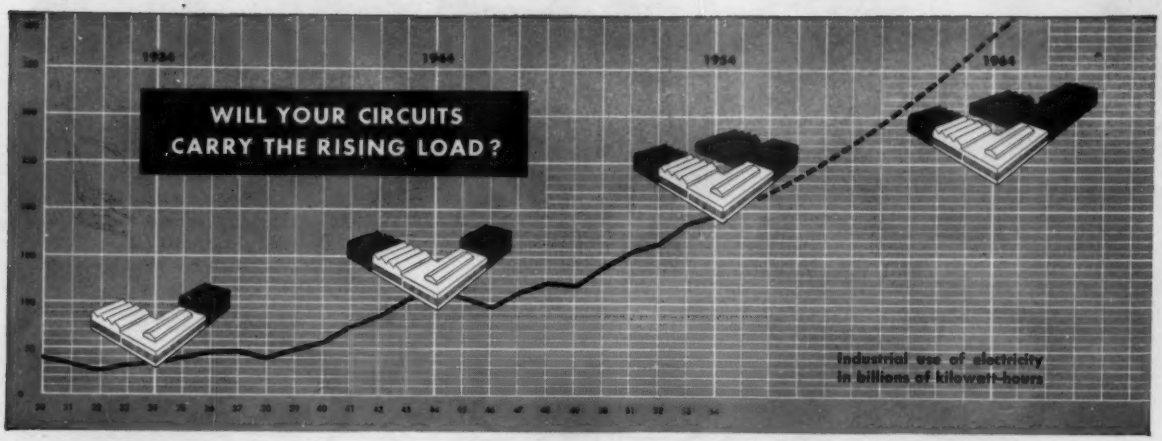
10—LIGHTWEIGHT HOSE with vinyl wearstrip

To protect and reduce exterior wear from contact with rough and abrasive surfaces, this company's hoses and retractable ducts made of coated fabrics and spiral wire reinforcement are now available with an added vinyl wearstrip. This wearstrip

is bonded over spiral wire reinforcement, and where hose is most exposed to abrasion and damage. In many spot air conditioning, ventilating, dust collection, fume control and materials handling uses, where lightweight flexible hoses are frequently dragged over rough surfaces, company points out, this wear resistant feature affords a longer service life. It also suggests use in applications previously considered too severe for lightweight hoses. The wearstrip is available for hoses in 4 in. through 12 in. ID, and retractable ducts in sizes 3 in. through 36 in. ID. The Flexaust Co.

11—THERMOSTAT UNITS tailored to individual needs

For accurate temperature control and overheat detection at heavy electrical loads to 20 amp, company announces the 20,000 Series of local-bulb snap action thermostats. The units fit operating conditions and user can specify thermostat features using the building-block principle. Designed for low-cost, accurate temperature control or heat detection, units come in many combinations of head styles and mounting arrangements for use in gases, liquids or solids. Starting with basic heat sensing unit (a bellows assembly and rod linkage enclosed in a



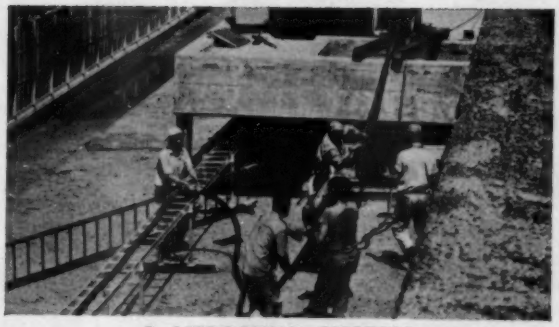
Protect your wiring investment with G-E feeder systems

New electrical equipment, processes, and materials handling methods double the industrial use of electricity approximately every ten years. Increased loads may create overload problems. Because the unstable voltages that result from overloads tend to increase distribution and equipment maintenance costs, and result in outages, faulty operation of equipment, and interrupted production—your plant, new or old, may quickly reach the point where a new or expanded distribution system will prove economical.

The versatility and expansibility of a G-E V-c interlocked armor cable feeder system, because it is designed to meet today's and tomorrow's needs, protects your investment. These systems can be installed quickly. Cables can be easily added or relocated to accommodate changes in load pattern.

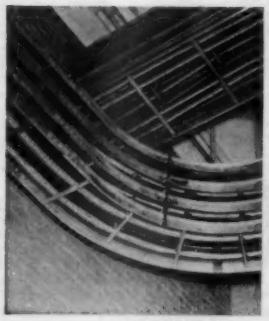
Installation costs on armor cable are lower, too. The highly flexible, G-E interlocked cable goes in fast—indoors or outdoors, around corners, over beams, and in long runs. Cable can be installed on low cost racks, baskets, troughs, or messengers, and can be spliced with simple mechanical joints. As a result, both engineering time and installation time are cut substantially.

For more information on handling increased loads this economical way, write Section W162-1064, Construction Materials Division, General Electric Company, Bridgeport 2, Connecticut.



A VERSATILE SYSTEM

No power winches were needed on the job. Installing crew pulled all cable by hand from reel on ground.



TYPICAL INSTALLATIONS

VCI bends easily. Corners and projections are no problem.

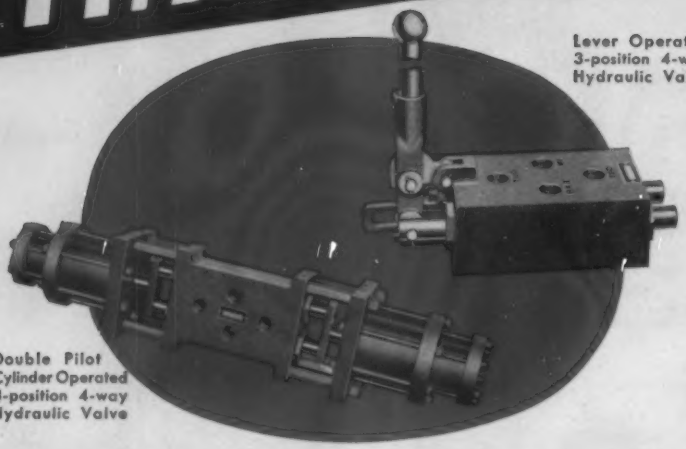
Building to building on messenger. A clean compact job.

Progress Is Our Most Important Product

GENERAL ELECTRIC

For more facts circle 577 on Reply Card

Quick-As-Wink® HYDRAULIC VALVES



Lever Operated 3-position 4-way Hydraulic Valve

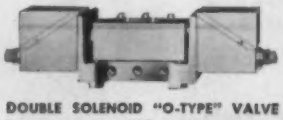
Double Pilot Cylinder Operated 3-position 4-way Hydraulic Valve

Hand and Pilot-operated Types for Water or Hydraulic Oils to 5000 psi.

• Quick-As-Wink Hydraulic Control Valves meet the most exacting requirements. These valves are fully balanced in any position. Patented design includes hydraulically balanced U-packers. Packers are floated while crossing the valving ports, thus assuring long life, and expanded by internal valve pressure to provide a tight seal. Maintenance is extremely low and usually can be done quickly in the field, avoiding the delay of returning valves to the factory for servicing, or the need of maintaining large standby inventories. For long, dependable, trouble-free service, specify Quick-As-Wink Hydraulic Valves. Write for Bulletin No. 531 and the fully descriptive Data Sheets. They give complete details. Write *today!*

Ask us also about . . .

CAM OPERATED SINGLE PLUNGER VALVE 3/8" to 3/4" sizes. Operated by rotating cam or land on reciprocating device.



DOUBLE SOLENOID "O-TYPE" VALVE for pressures up to 125 psi. Widely used as pilot valves and for operating air cylinders.

Quick-As-Wink®
AIR AND HYDRAULIC
Control Valves

Hand, Foot, Cam, Pilot, Diaphragm and Solenoid Operated

Mfd. by C. B. HUNT & SON, INC., 2088 East Pershing St., Salem, Ohio

For more facts circle 578 on Reply Card

NEW PRODUCTS

(Begins on page 152)

liquid filled cylindrical housing), user can choose from among four basic thermostat features and several modifications —three temperature ranges, 50-300 F, 0-250 F, and -50 to 200 F; six types of snap switches; four basic head types; and two mounting arrangements.

Basic sensing bulb is 5/8 in. in diameter, 3½ in. long. An insulating air space between top of bellows assembly and thermostat head eliminates biasing control temperature because of radiant heat losses from shell. Prices of basic units start at about $7.50. Fenwal Inc.

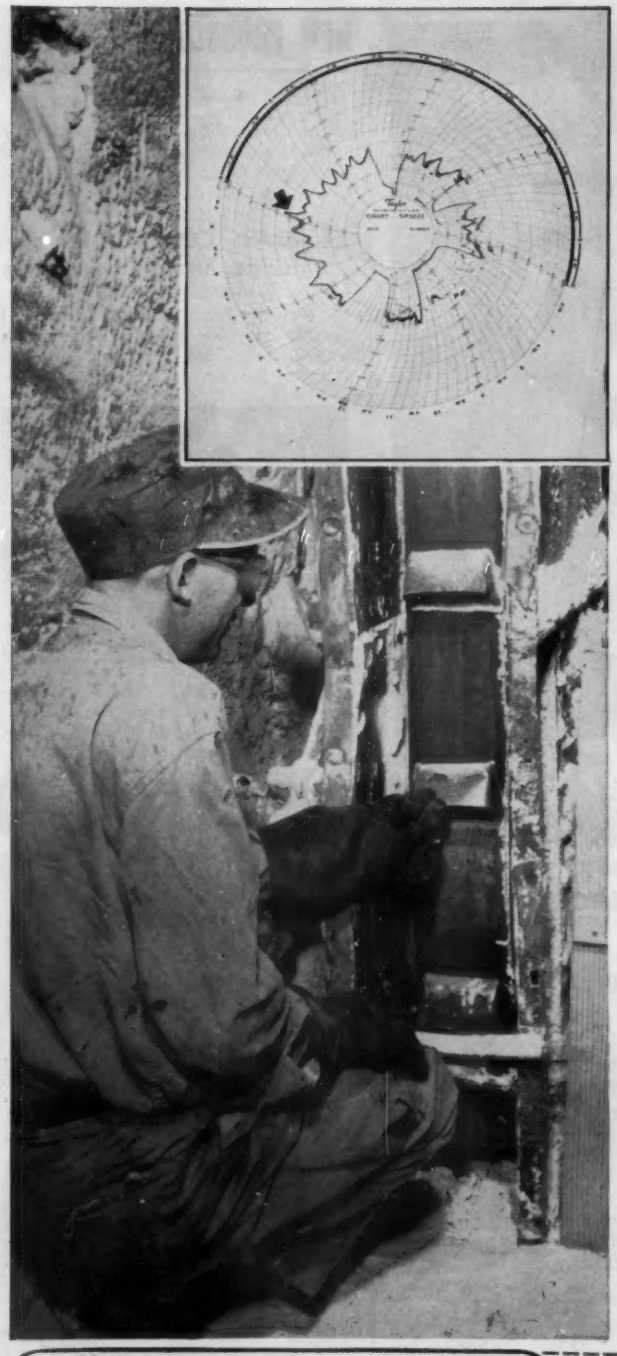
More information on any of these products can be yours without cost or obligation. Just circle the item numbers on the Reader Service Cards provided on pages 235-236.

12—ALUMINUM PAINT in blue, green and gold

Using aluminum pigment supplied by Aluminum Co. of America and a special additive, this paint manufacturer has developed colored aluminum paint. Recent inspections of the California plant for which the paints were developed are reported to show that neither rain nor sun has noticeably affected the 2-year old surface. The paint film — overlapping layers of metal flakes, five to 10 layers thick, cemented together by a watertight vehicle—is also said to have offered impregnable resistance to plant fumes and moisture. Experience on this installation also showed that a single coat covers and hides even a colored surface, says company. Although the colored aluminum paints were sprayed on in this installation, they can be brushed on when a suitable solvent is used as a thinner. A full range of colors in the aluminum-pigmented paint is under development, says manufacturer. Blue, green and gold are now made. Gilmore & Nolan, Inc.

13—POTTING COMPOUND of elastomeric materials

Compounded to withstand thermal shock, Pro-Seal 727 Potting Compound is also said to meet demands where flexibility combined with high electrical performance is a specific requirement. It is made of elastomeric materials withstanding temperatures from below –60 to 180 F. Another feature announced is that the cured compound forms a strong, resilient, low shrinkage rubber, with its base material being approximately 97 per cent solids. Its pourable viscosity allows for escape of entrapped air, it is noted, resulting in a high density core. Other features cited are resistance to gasolines, oils, greases and other petroleum products, including pressure lubricants and stand-



Temperatures up to 270°C. didn't damage this hot-materials belt of Du Pont HYPALON®!

Lifting hot salt from a rotary drying kiln to a loading platform is rough duty for any belt—particularly when the salt's temperature averages 150°C. Engineers at a large chemical plant found that the best "elevator" belts available weren't up to this kind of service. Heat caused cracking around the monel buckets attached to the belts. Three months on the job was the limit.

It took a specially designed hot-materials belt covered with HYPALON, Du Pont's new chemical rubber, to provide the necessary heat resistance. This belt has given *6 months' perfect service*—double the service life of previous belts. Note the chart above. This is a typical 24-hour record of the salt's temperature as it leaves the oven to be picked up by the HYPALON belt. A peak temperature of 270°C. (518°F.) is indicated!

In operation 50% of the working day, the belt has little chance to cool off on duty. Sheet metal encloses it as it runs to and from the loading tower. It's another excellent example of the extreme service conditions for which HYPALON is admirably suited. No other elastomer can match its combination of superior heat resistance and resistance to flex cracking, abrasion, oil and grease.

Let HYPALON save for you. In tank linings, it offers excellent resistance to oxidizing chemicals; in electrical applications, *complete* ozone resistance; in outdoor coatings, resistance to sunlight and weathering. Ask your rubber-goods supplier about the HYPALON products he sells. You'll *save* with their exceptional durability.

SEND FOR FREE BOOKLET. Our new booklet describes the properties of HYPALON, lists the products made with HYPALON that are now available. Just clip and mail the coupon.

HYPALON®

CHEMICAL RUBBER

DU PONT

REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

E. I. du Pont de Nemours & Co. (Inc.)
Elastomers Division, Dept. PL-10, Wilmington 98, Del.

Please send me your booklet on Du Pont "Hypalon."

*Name*_____ *Position*_____

*Firm*_____

*Address*_____

*City*_____ *State*_____

For more facts circle 579 on Reply Card

Separates 7 cu. ft. of parts and tumbling chips in just 10 minutes

STEARNS MOBILE MAGNETIC PARTS SEPARATOR

You can separate steel parts from deburring chips in minutes instead of hours with a Stearns Magnetic Parts Separator. As mixture cascades from feeder, the powerful Stearns drum-type magnet lifts parts to belt which conveys them to demagnetizer. Non-magnetic chips fall into suitable receptacle for re-use.

Make these Stearns advantages work for you!

Big Labor Saver — No hand picking or screening. No attention required while unit is operating.

Non-Choking Adjustable Feeder — Regulates flow of material . . . handles parts of various sizes and shapes.

Positive Separation — Lift principle pulls steel parts up and out of chips or deburring compound . . . eliminates entrapment of parts.

No Magnet Operating Expense — Permanent, powerful Alnico V magnet needs no current.

Completely Self-Contained Mobile Unit — No separate feeders, chutes, hoppers. Just connect drive motor to current and you're ready to operate. Mounted on wheels for easy movement around plant.

Protection for Parts — Hopper and feeder are rubber-lined.

Parts Fully Demagnetized.

Find out how a Stearns Parts Separator cuts handling costs. Write today for Bulletin 110.

1089

MAGNETIC EQUIPMENT FOR ALL INDUSTRY

STEARNS MAGNETS

STEARNS MAGNETIC, INC., 669 S. 28th St., Milwaukee 46, Wis.

For more facts circle 580 on Reply Card

NEW PRODUCTS

(Begins on page 152)

ard red hydraulic oil. It is exceptionally resistant to water and weathering, company says. Weight is 15 lb per gallon. Coast Pro-Seal & Mfg. Co.

14—BRASS CONDUIT for cartridge heater lead wires

Greater mechanical protection for electric cartridge heater lead wires is claimed possible with this flexible brass conduit lead wire enclosure. According to manufacturer, the flexible brass conduit pro-

tects the entire length of lead wire by shielding against abrasion, flexing stress, other moving parts, and it affords a high safety factor where lead wires are normally exposed to the operator. Tests are reported to show greatly increased lead wire life expectancy. The flexible conduit is available on new electric cartridge heaters in a full range of lengths and wattages for 3/16-, 1/2-, 5/8- and 3/4-in. diam heaters. The conduit may be ordered with a straight connection to heater or with 90 deg, right-angle fitting for confined spaces. Edwin L. Wiegand Co.

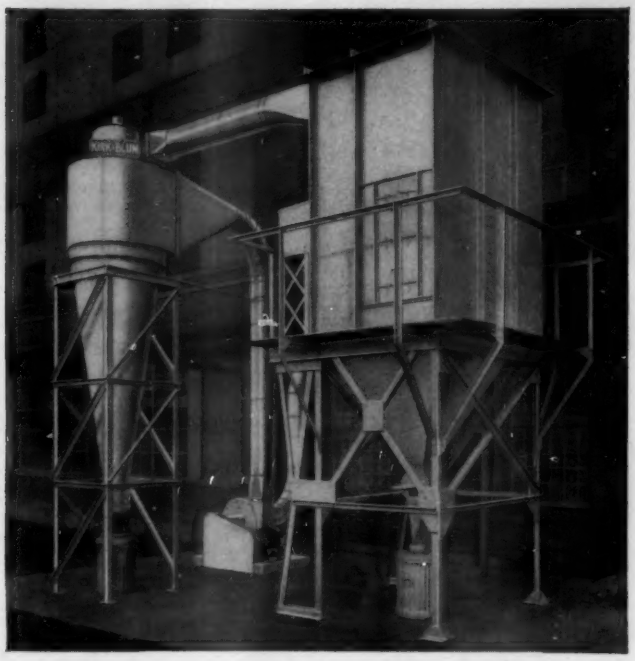
15—EXHAUST FAN is heavy duty, propeller type

Designed specifically for industrial installations is the Model K Ventura Fan, available with two-speed or constant-speed direct drive totally enclosed motors. A large range of sizes cover capacities from 587 to 12,800 cfm. The heavy duty propeller type fan will operate against static pressures up to 5/8 in., it is noted, and its streamlined inlet permits a free flow of air with minimum resistance in exhausting smoke, fumes and other contaminants. American Blower Corp.

16—ZINC COATING for existing steel structures

Plant maintenance painters can now give existing steel structures the same protection that galvanizing affords, it is announced, plus salt water resistance, with a protective coating called Dimecote. Not a paint, although applied with brush or spray, Dimecote is described as a 100 per cent inorganic, metallic zinc coating that contains no oils or resins. Only one coat is required for most applications. Material cost is said to be less than 6 cents per sq ft. Not only is it resistant to severe weathering and abra-

Two-stage air cleaning: high efficiency centrifugal collector (at left) plus cloth media filter.



pharmaceutical manufacturer finds

KIRK AND BLUM DUST CONTROL

"just what the doctor ordered!"

To maintain rigidly controlled and conditioned plant atmosphere, air returned from cleaning operation is heated or cooled as required.

To insure, in all manufacturing steps, the purity of The Wm. S. Merrell Company's products, Kirk & Blum Dust Control Systems were installed by this well known pharmaceutical manufacturer. Dust is eliminated at its source to meet the plant's strict requirements. Since the building is air conditioned, cleaned air is tempered (warmed or cooled) before it is returned to the plant.

Whatever your problem, put it up to experts in air handling . . . KIRK & BLUM—with over 48 years' experience in Dust and Fume control.

KIRK & BLUM

DUST CONTROL

FOR ILLUSTRATED LITERATURE . . . WRITE TO

THE KIRK and BLUM MANUFACTURING CO.

3189 FORRER STREET, CINCINNATI 9, OHIO

For more facts circle 581 on Reply Card

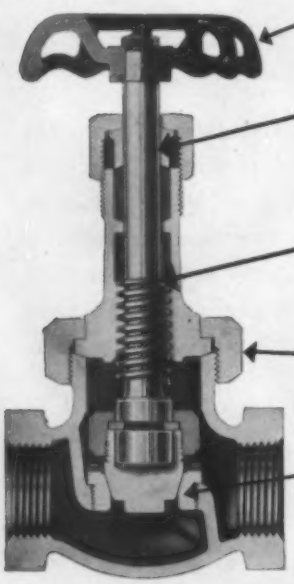
THE KENNEDY "500 BRINELL"

Bronze Globe and Angle Valves *with* Stainless Steel Seats and Discs

KENNEDY'S "500 Brinell" valves set a new quality standard in valve design, engineering and performance. New, rugged construction features cut your maintenance costs because KENNEDY'S "500 Brinell" valves give you longer service life on your toughest jobs. Specially-treated, super tough stainless steel seats and discs give you leakproof performance because they banish common valve enemies. Check these new built-in quality features and see why KENNEDY gives you the greatest valve value:

TWO DISC TYPES { FULLWAY / PLUG TYPE } TWO PRESSURE RATINGS { 200 lbs. / 300 lbs.

Fig. 139S	200 lbs.	Fullway	Globe	¼" to 2"
Fig. 139S	200 lbs.	Fullway	Angle	¼" to 2"
Fig. 139PS	200 lbs.	Plug Type	Globe	¼" to 2"
Fig. 139PS	200 lbs.	Plug Type	Angle	¼" to 2"
Fig. 544S	300 lbs.	Fullway	Globe	¼" to 3"
Fig. 546S	300 lbs.	Fullway	Angle	¼" to 3"
Fig. 544PS	300 lbs.	Plug Type	Globe	¼" to 3"
Fig. 546PS	300 lbs.	Plug Type	Angle	¼" to 3"



"PISTOL-GRIP" HANDWHEEL . . .
Fits your hand, gives you a firm, easy 3-way grip on top, sides and bottom! Full palm protection, too.

KENALLOY STEM . . .
A new, exclusive KENNEDY stem material that eliminates stem failures because it removes the cause of failures.

ACME THREAD
Eliminates feather-edge ends which, in ordinary valves, can break off and lock stem in the bonnet.

UNION BONNET . . .
A stronger, tighter joint that easily withstands pressure and pipe wrench punishment.

STAINLESS STEEL SEATS, DISCS
"500 Brinell" hardness eliminates cutting by foreign objects, pitting, erosion, corrosion and wire-drawing.

• *FOR COMPLETE DETAILS WRITE FOR NEW BULLETIN 110*

THE KENNEDY VALVE MFG. CO.
1066 EAST WATER ST.
ELMIRA, NEW YORK
VALVES • PIPE FITTINGS • FIRE HYDRANTS

OFFICE-WAREHOUSES IN NEW YORK, CHICAGO, SAN FRANCISCO • SALES REPRESENTATIVES IN PRINCIPAL CITIES

For more facts circle 582 on Reply Card

NEW PRODUCTS

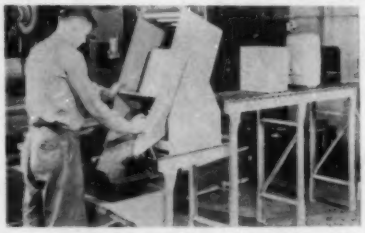
(Begins on page 152)

sion, but it is claimed unaffected by solvents and petroleum products.

Coating is reported successful on structural steel, floating roof tanks, barges, marine drilling towers, dam gates. A feature of the coating, company notes, is that the film cathodically inhibits corrosion of contingent areas of bare steel. When Dimecote is applied, company says, a reaction takes place at surface which produces chemical bonding as well as physical adhesion—it is almost impossible to find the interface. Amercoat Corp.

17—LOADING DEVICE for small parts handling

For speeding and simplifying the transfer of small parts from shipping boxes to in-plant containers, the NesTier Rollover Loader is reported to reduce manual operations and damage to parts and to facilitate inventory control and promote



orderliness. In operation, a full box or keg with lid removed is slid into the Rollover Loader. Rotation of unit on pivot trunnions causes parts to flow into pouring spout, which has a hinged retaining gate. A control lever permits measure flow of parts into tote boxes, handling baskets, bins, etc. When contents are emptied, the unit is rotated back to "load" position and the cycle repeated. Available as an accessory is a NesTier stand which contains a short length of roller conveyor; it will store several containers ready for discharge. Chas. Wm. Doepke Mfg. Co., Inc.

18—MAGNET for belt conveyors on sand slingers

The Model 45 Sand Slinger Magnet is for installation at the discharge end of belt conveyors on sand slingers and speed slingers. Its purpose is twofold: to protect workers from fast-flying pieces of iron which might normally bounce off the sides of sand slingers, and to purify the molding sand of any ferrous contamination. According to manufacturer, this magnet is so constructed that sand coming off the end of the belt at speeds of 375 fpm in quantities to 2000 lb per minute impinges on the face of the magnetic assembly and then drops into a hopper where it is fed into the impeller head—but any geigers and other iron particles are held by the magnetic deflectors. Two magnetic units are incorporated—in the vertical back assembly, angled inward

Frey-Yenkin Paint Company's Majestic Aluminum Paint protects, beautifies Akron Expressway bridge

Painting contractor estimates savings of 15%

Bridges on the new Akron Expressway are protected with attractive, long-lasting aluminum paint. The Miller Contracting Company states that aluminum paint's great coverage and one coat hiding power made their job easier, saved money. After working with aluminum paint on all types of industrial structures, they estimate ". . . it effects an over-all saving of not less than 15%." They also find that, even after years of weathering, aluminum paint will give good protection, retain its attractive, metallic appearance. This contractor has discovered that aluminum paint is the most economical, most durable paint to use for applications like the Akron Expressway bridge.

ALCOA does not make paint, but ALCOA Aluminum Pigments are used in more aluminum paints than any other brand. Special formulas have been developed by your paint manufacturer to solve individual problems.

For more information on all types of aluminum paint and aluminum roof coatings, write today for our FREE booklets, *Painting With Aluminum* and *Aluminum Asphalt Roof Coatings Make Time Stand Still.* Use the coupon.

Akron Expressway bridge, Akron, Ohio, coated with 2,500 gallons of Majestic Exterior Heavy-Duty Aluminum Paint, pigmented with ALCOA Aluminum, and supplied by **Frey-Yenkin Paint Co.**, Columbus, Ohio. Painting Contractor, The Miller Contracting Co., Canton, Ohio.

PIGMENTED WITH
ALCOA
ALUMINUM
ALUMINUM COMPANY OF AMERICA

Paint Service Bureau, Aluminum Company of America
1790-K Alcoa Building, Pittsburgh 19, Pennsylvania

Please send me your FREE booklets:
☐ Painting With Aluminum
☐ Aluminum Asphalt Roof Coatings Make Time Stand Still

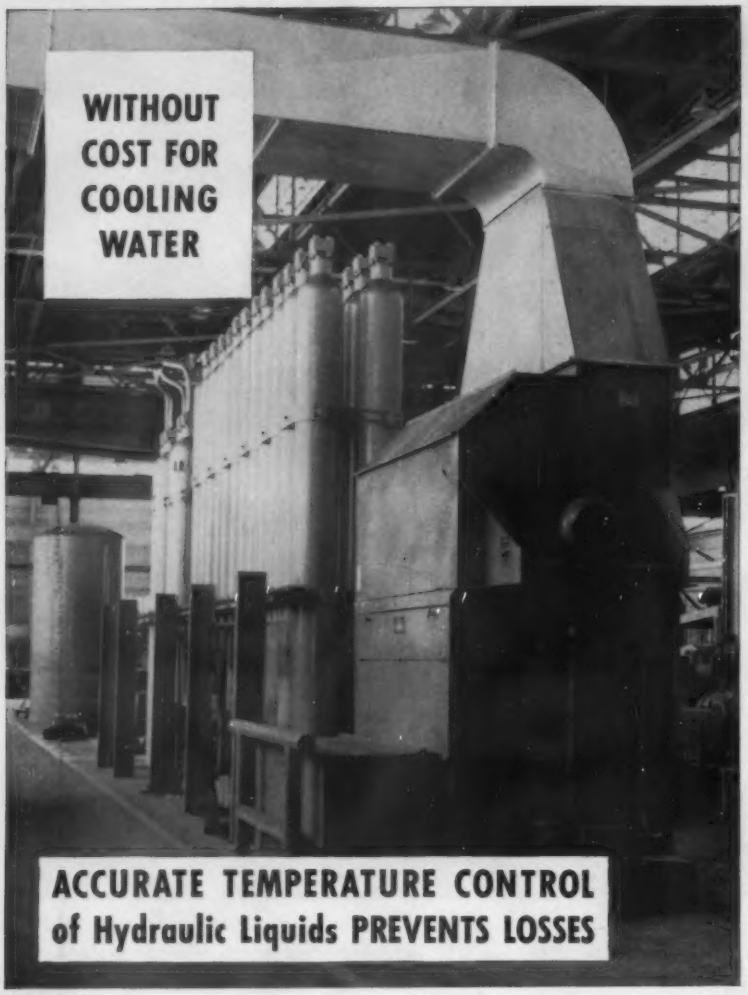
Name_____

Company_____

Address_____

City_____ Zone____ State_____

For more facts circle 583 on Reply Card



● This NIAGARA AERO HEAT EXCHANGER cools the liquid for a large hydraulic press, preventing heat damage to the pump stuffing boxes. Using outdoor air as the evaporative cooling medium, it removes the heat at the rate of input (1,875,000 BTU/hr.) with no cooling water consumption except a negligible amount evaporated.

Air is free and cheaper to move than water. You can save much expense in pumping, piping and power, and quickly recover the equipment cost from the water saving.

Similar Niagara machines cool water, oils, solutions, lubricants and coolants for many mechanical, electrical and chemical processes. You can cool quench baths, welding machines, plastic molds, furnaces, controlled atmospheres, gases, compressed air either for power or instruments or processes. In a closed system, your coolant is never contaminated. The system is simple and easy to keep up; the equipment has a long, useful life. Select from a wide range of sizes up to 30,000,000 BTU.

Write for Bulletin 120 to obtain a complete description.

NIAGARA BLOWER COMPANY

Dept. PE, 405 Lexington Ave. **New York 17, N. Y.**

Niagara District Engineers in Principal Cities of United States and Canada

For more facts circle 584 on Reply Card

NEW PRODUCTS

(Begins on page 152)

at corners to form a cup-shaped magnetic field, and in the upper, horizontal plate which is hinged to allow for accessibility in removing tramp iron. Eriez Mfg. Co.

19—TORQUE REDUCER for the large size valves

Recently introduced is a planetary gear torque reducer which permits one-man operation of this manufacturer's 10-, 12-, and 14-in. Saunders Patent Diaphragm Valve. The torque reducer provides a 5 to 1 mechanical advantage and is available on either handwheel or chain-operated valves. It may be had on new valves, or applied to those already in service. The gear assembly is mounted at the top of the bonnet and increases the overall height of the valve by only 7½ in. Hills McCanna Co.

20—SCRUBBERS for acid and other corrosive fumes

Fume scrubbers in the 720 series are declared particularly suited to pickling operations, electroplating process and anodizing installations. They are available in eight standard sizes from 1000 to 30,000 cfm in the following materials of construction: Rigidon (glass reinforced plastic) for most acids including hydrochloric, sulfuric, phosphoric and nitric; rubber-lined steel for hydrochloric, hydrofluoric, sulfuric, phosphoric and most acids as well as caustics; carbon steel for most caustic and chromic acid fumes; other alloys for special applications. It is pointed out that the solid plastic scrubber is particularly advantageous since it is immune to acid fumes outside as well as internally. The scrubbers have no moving internal parts, it is explained, and operate on the principle of water spray absorption and mist conditioning followed by a cyclonic separation. Heil Process Equipment Corp.

21—FOOT WARMER is electrically heated mat

Suggested for reducing complaints of cold feet is the portable Electro-Mat, an electrically heated Neoprene rubber mat, 14 by 21 in. in size. According to manufacturer this mat is both safe and economical—it consumes less power than a 100-w light bulb and retails for around $8.00. Interstate Rubber Products Corp.

22—INDUCTOR MOTOR is low-speed synchronous type

Type SMY Synchronous Inductor Motors feature slow-speed synchronous operation, instantaneous acceleration and deceleration, and instantaneous reversing, it is announced. The motors are designed for applications requiring moderately high torque at low speeds, synchronous speed operation, or rapid deceleration or reversing. They are available in torque ratings

✓ Industry wipes out corrosion with Firestone Exon Resins

NEW PVC "SANDWICH" starves out corrosion!

High speed silver plating solutions are not only corrosive, but they must also be kept free from contamination to perform satisfactorily. Various plasticized types of coatings were quickly corroded by the special inorganic addition agent in the silver solution. Unplasticized PVC was suitable, but could not be bonded to a steel tank.

Comco, Inc., New Haven, Connecticut, solved this problem for General Electric Company's Philadelphia Switchgear Plant by fabricating a huge hot-rolled steel plate tank able to support the 200 gallons of special silver plating solution and lined it with VYFLEX FL-85.*

This remarkable lining, only .085" thick is actually two sided. One side is rigid Unplasticized PVC made of Exon 402-A resin, which is exposed to the silver plating solution stopping corrosion and preventing contamination. Its back is Plasticized PVC based on Exon 900 series resin, which, by being laminated to the Unplasticized PVC, makes possible the lining of metal tanks with Unplasticized PVC, and overcomes the varying rates of expansion between PVC and steel.

Another proof of how effectively a corrosion problem can be solved by the unusual versatility of resins engineered by Firestone.

Flexible PVC bonds Rigid PVC to steel tank—permanently!

Firestone

EXON®

*Vyflex FL-85 is made from Exon resins *Product of Kaykor Industries, Inc. Division of Kaye-Tex Mfg. Corp., Yardville, N. J.

The simple fact is: *You* can stop corrosion. EXON PVC resins are the bases for a wide variety of corrosion controlling materials. In the form of lightweight structural rigids, linings or coatings, these versatile materials differ in properties, each one of them geared to solve a different, specific corrosion problem. For details that will interest you in particular, call or write:

CHEMICAL SALES DIVISION
FIRESTONE PLASTICS COMPANY, DEPT. 15V, POTTSTOWN, PA.
A DIVISION OF THE FIRESTONE TIRE & RUBBER COMPANY

For more facts circle 585 on Reply Card

Here's Lift Power that Lowers Costs!

SIMPLEX JACKS

Engineered to deliver maximum power at minimum weight, Simplex Hydraulic Jacks meet every jacking need with ease, safety and dependability. Eight models, in capacities from 3 to 100 tons, Sold *only* through Industrial Distributors.

Get your free guide to jack selection. Ask for Bulletin HYD. 53.

A Jack for Every Purpose

The Simplex line of jacks is complete. It includes rachet lowering, track, screw and hydraulic jacks; self-contained and remote-controlled center-hole pullers; trench and timber braces. Buyers have known Simplex means quality in jacks for more than 50 years.

WORLD'S LARGEST MFGRS. OF INDUSTRIAL MECHANICAL AND HYDRAULIC JACKS

SIMPLEX JACKS

RE-NU-TOOL JENNY UTIL-A-TOOL EDL-TOE

TEMPLETON, KENLY & COMPANY

2561 Gardner Road
Broadview, Illinois

For more facts circle 586 on Reply Card

NEW PRODUCTS

(Begins on page 152)

of 75 and 2-oz-in. at 60, 50, and 25 cycles. Typical installations, according to company engineers, are remote-operated beacons and searchlights, recording devices, and control and feed motors. Synchronous characteristics are used by industrial process timers since sufficient torque is developed by motors to operate cams and levers, eliminating need for a second motor or solenoid in many applications. Low speed and rapid deceleration are also claimed to make SMY motors suitable for jobs which previously required a gear-motor, brake motor, or both. General Electric Co.

23—STEEL STRAPPING has curved edge

Announced as an ideal banding strap for paper rolls and similar products, Edge-Grip features a curved edge. It comes in ¾-in. width in 0.020 gage steel. Allegheny Steel Band Co.

24—PROTECTIVE LINING for metal container

All kinds of metal containers for corrosive chemicals — pots, buckets, vessels and tanks — it is announced, can be protected with linings of Fluorolin 202. The

material combines the chemical inertness of Kel-F with the mechanical rigidity of aluminum foil spread-coated with pressure-sensitive adhesive. Linings can be cut out, assembled on the job and pressed into place like wallpaper. Joints may be butted and sealed with strips of the same material. The only tools required are a straight edge and shears. Joclin Mfg. Co.

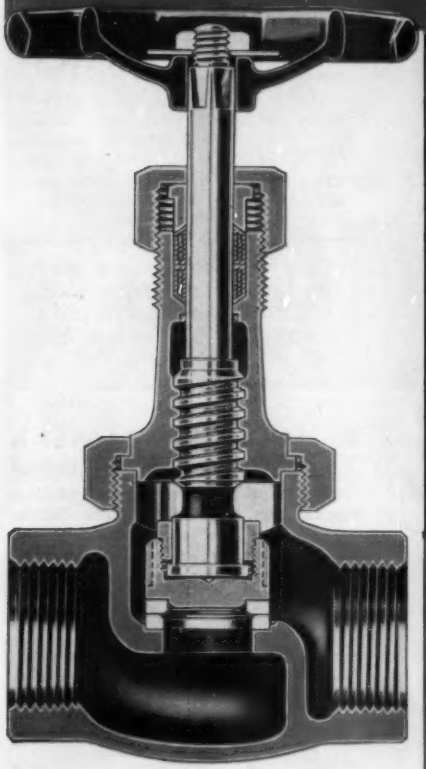
25—AIR COMPRESSOR is high capacity piston type

Announced as radically new in design, this high capacity piston type air compressor is said to deliver perfectly oil-free air. All units are constructed for continuous operation while delivering up to 175 psi pressure. Industrial applications are said to be limitless—instead of one central compressed air station supplying air for countless industrial duties, individual motor driven, oil-less compressors can be mounted

Biggest Valve News in 50 Years!

LQ600

THE REVOLUTIONARY NEW BRONZE VALVE



BRINALLOY SEATS and DISCS

HERE'S THE BIGGEST BRONZE VALVE NEWS IN HALF A CENTURY—made possible by Brinalloy, a new patented seating alloy developed in the Lunkenheimer Metallurgical Research Laboratories. Seats and discs of this new alloy are far more resistant to wear and corrosion than 500 Brinell Stainless Steel — they even outwear case-hardened Stainless Steel exceeding 1000 Brinell! In the most severe tests, there was no need for renewability, repair, or replacement.

LUNKENHEIMER L® QUALITY

NOW you can beat the high cost of valve maintenance and replacement with the first completely revolutionary bronze valve in 50 years! No matter how severe the throttling service, in 4-year tests, there was no leakage, erosion, or wire drawing. This new valve pays cash dividends in maintenance savings — *year after year after year!* For more information, call your Lunkenheimer Distributor or write The Lunkenheimer Company, Box 360, Cincinnati 14, Ohio.

* *Patented Alloy*

BRONZE • IRON • STEEL • PVC

LUNKENHEIMER®

THE ONE *Great* NAME IN VALVES

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WHERE? . . . Only minutes away from the ASME Meetings at Chicago's COLISEUM . . . one floor with information-packed exhibits—a minimum of walking to get a maximum of facts, helpful tips—a complete picture of Power and Mechanical Engineering TODAY!

WHEN? . . . November 14-18, 1955

WHY? . . . This special show is in conjunction with the 75TH ANNIVERSARY MEETING OF THE ASME. The significant theme of these sessions is "THE ENGINEER AND THE WORLD OF COMMERCE AND INDUSTRY." Subjects of vital importance to *your* field of interest will be covered. At the EXPOSITION, you'll see the newest, most advanced power equipment . . . manufacturers' exhibits that will show hundreds of new techniques to improve productivity and economy, and to utilize all types of power more effectively.

Plan now to attend the

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480 Lexington Avenue New York 17, N. Y.

For more facts circle 588 on Reply Card

NEW PRODUCTS

(Begins on page 152)

where compressed air is needed. Portability and low cost make them adaptable to all types of industrial maintenance, it is pointed out, and oil-free feature suits them to pneumatic tools and control systems.

The use of specially constructed graphite or carbon piston rings accounts for the oil-less feature. External mix type spray guns allow cleaning without dismantling. Units are rated for continuous operation at 35, 75, and 175 lb and from ¼ to ¾ hp. Types available include motor compressors, tankless units with check valve and automatic pressure switch, tank units with automatic pressure switch and check valve, and paint sprays. Bell & Gossett Co.

One of these products may be "just what you're looking for." Use the handy Reader Service Cards to ask for more information on it.

26—ANODIZING BASKET is made of perforated metal

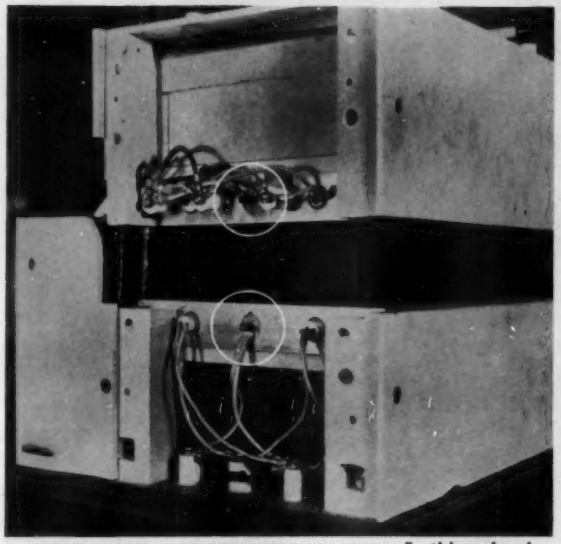
Anodizing of small metal parts such as screws, nuts, and camera parts can be handled in this aluminum anodizing basket. Of welded and riveted construction, it features an adjustable cover to hold the correct amount of tension on the parts, depending on the load carried. It is 6¼-by-24 in. overall, with the aluminum handle and threaded bar ½ in. in diameter. Basket is made of 11 gage aluminum with a ⅛ in. perforated hole, staggered 3/16 in. Hangers are 1 by ⅛ in. aluminum flat stock, riveted to a copper flat stock bar. Wiretex Mfg. Co., Inc.

27—EXTINGUISHING SYSTEM uses CO_2 under pressure

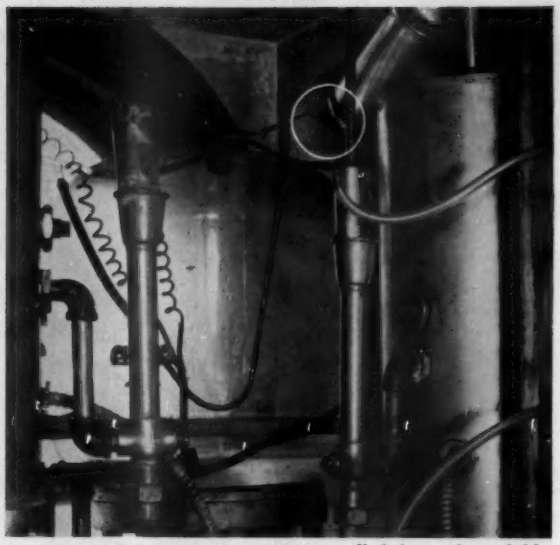
Suitable for Class B or C hazards (flammable liquid or electrical equipment) this flexible system operates on a rate-of-temperature-rise principle and uses carbon dioxide under pressure of 850 psi both for its power and as its fire extinguishing agent. The apparatus is self contained and requires no outside power source. If a fire occurs, the rapidly rising heat increases air pressure within one or more small heat actuators mounted throughout the hazard area. This increased pressure is transmitted through small diameter copper tubing to master pneumatic control heads mounted on two of the CO_2 storage cylinders.

This impulse triggers the control heads, releasing the pressurized CO_2 in the two cylinders. This gas rushes from its containers and enters manifold piping to which other carbon dioxide cylinders are connected and opens the pressure-operated valves of these other cylinders, releasing their gas. The total charge then is routed through piping to the fire area where it

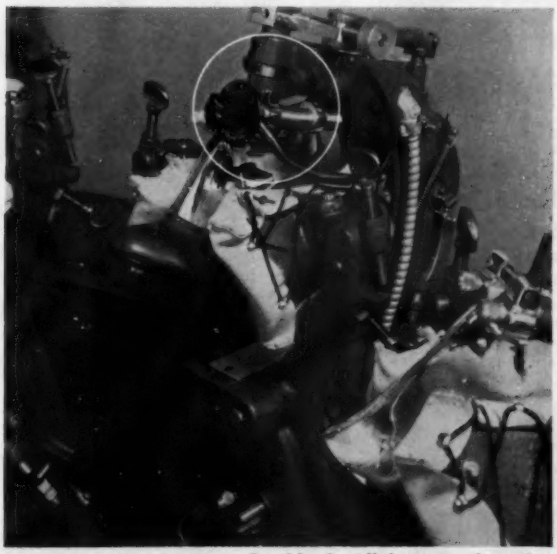
How would you solve these tricky temperature control problems?



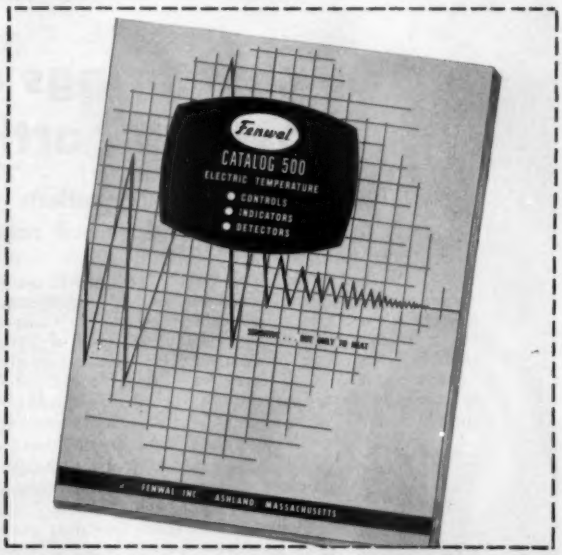
1. CONTROLLING HIGH FREQUENCY HEATING. In this vulcanizing patch press, precise temperature control of the platens was required to prevent loss of electronic heat generated within the processed material. Fenwal's solution was two THERMOSWITCH® units, set at 400F, mounted on the platens. Result: a production rate of 3,000 patches per hour, compared to ordinary hot press methods of 30 per hour.



2. SAFETY IN A DISTILLING PROCESS called for a dependable failure alarm. A Fenwal THERMOSWITCH unit in the condenser's safety vent solved the problem. Now, should the cold water supply fail, steam blowing through the condenser tubes will hit the THERMOSWITCH unit. This control, set at 120F, will then open, shutting off the electric heaters and sounding a continuous alarm.



3. PROTECTING PRODUCTS. In this shoe lining smoother, the problem was twofold: to use the fewest possible thermostats; provide close temperature control in order to prevent burning of shoe leather. Fenwal's solution: a single adjustable THERMOSWITCH unit, mounted on one ironer and controlling two ironers. This halved the number of thermostats indicated, while providing precision temperature control.

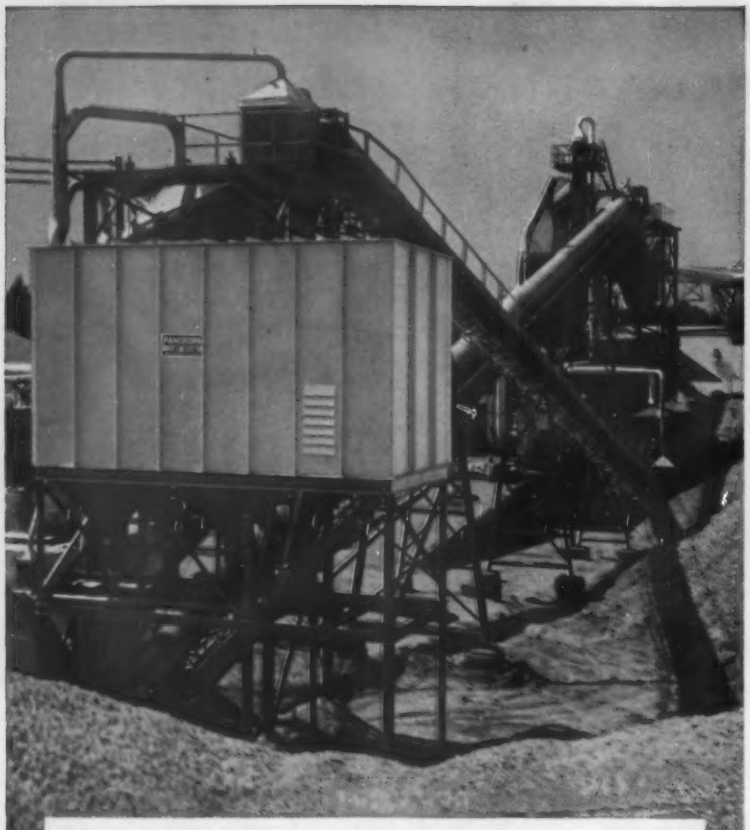


4. SEND FOR NEW CATALOG, just off the press. It describes Fenwal's complete line of THERMOSWITCH units and new indicating controllers for industrial applications. Fenwal engineers are always glad to help on any of your temperature control problems. Write **Fenwal Incorporated, 3510 Pleasant St., Ashland, Massachusetts.**

Fenwal **THERMOSWITCH®**

Controls Temperature — Precisely

For more facts circle 589 on Reply Card



Fletcher brings dust "down to earth!"

Pangborn Dust Control collects valuable material to be sold as soil conditioner

The H. E. Fletcher Co., West Chelmsford, Mass., produces a wide variety of granite products. When Fletcher recently expanded plant operations, the firm installed Pangborn Dust Collectors on the recommendation of an already-satisfied user of Pangborn Dust Control. The results at Fletcher have been extremely gratifying. Costs have been cut in three ways: valuable collected material is sold as soil conditioner, the life of expensive machinery is lengthened by reducing dust damage, and plant housekeeping is cheaper and easier. Other benefits, according to the company, include the reduction of health hazards to employees and the improvement of product quality.

Pangborn can solve *your* dust problem. Pangborn engineers will be glad to show you how Pangborn Dry or Wet Dust Collectors can save you time, trouble and money!

See how Pangborn benefits varied industries. Write for free copy of "Out of the Realm of Dust." Pangborn Corp., 3200 Pangborn Blvd., Hagerstown, Md. *Manufacturers of Dust Control and Blast Cleaning Equipment.*

Pangborn
CONTROLS DUST

For more facts circle 590 on Reply Card

NEW PRODUCTS

(Begins on page 152)

discharges from nozzles. Enough carbon dioxide is introduced to reduce oxygen from a normal concentration of 21 per cent to under 15 per cent—not enough to support combustion — and the blaze is smothered.

It is pointed out that by means of easily added devices this basic system can be adapted to special problems concerned with the protection of virtually any Class B or C hazard. Two features are claimed unique to this system. Every pneumatic control head has an indicator which shows whether the system is ready for action or has been discharged. Also, the equipment is designed to permit testing of all parts of the system at will without discharging the cylinders. Walter Kidde & Co., Inc.

28—METAL REMELTER for white metals and alloys

For the rapid melting of white metals and all alloys that melt below 1000 F, this remelter operates on gas, electricity or oil. Crucible and exterior housing are square or rectangular in order to conserve floor space. The furnace is charged

from the top through an insulated hinged cover. Pot capacity ranges from 600 to 10,000 lb. A feature announced for this remelter is a drip-proof bottom pouring valve seated within the pot to allow for expansion and contraction. The self-lapping valve is inside the crucible where it is subject to maximum temperature at all times, to eliminate possibility of the valve freezing. Though melting time depends on type of heat used, the unit requires about 2 hr to melt a full pot from a cold start. Recovery time for new loads is 1 hr. Nolan Corp.

29—MOLDABLE METAL is aluminum-based paste

Lab-Metal is announced as an improved cold metal solder—an aluminum-based compound in paste form. Upon drying it hardens to form a strong permanent bond to metal, wood, plaster, glass or plastic, says manufacturer, providing a hard, rustproof, waterproof, metallized surfaces. Its use is simple, since neither heat nor mixing is required. It spreads

Like Sound Couplings?

GET NE Sherarduct

RIGID STEEL CONDUIT

Sound couplings . . . that's another big Sherarduct advantage!

Sherarduct's accurately cut threads let conduit ends butt inside the coupling . . . eliminate gaps that interfere with easy fishing. This provides a sound, thoroughly grounded coupling, sealing off moisture and corrosion.

The couplings are fortified by the same Sherardizing process of dry galvanizing that provides lifetime protection for Sherarduct conduit. Sherardizing actually alloys pure zinc with the steel wall of the conduit (including the hills and valleys of every thread), providing a permanent barrier to corrosives.

During the Sherardizing process, the steel conduit is normalized by gradual heating and cooling. Thus the conduit can be easily bent and formed on the job without springback or deformation.

After Sherardizing, a special clear acid-resistant coating, called Shera-enamel, is baked on inside and out. This completes the protection of all surfaces from corrosion, and produces a smooth raceway for fast, easy fishing of conductors.

LIFETIME CORROSION PROTECTION
•
EASY FISHING
•
ZINC PROTECTED THREADS
•
STRONG COUPLINGS
•
THOROUGH GROUNDING
•
EASY BENDING

Write today for your free Sherarduct facts book . . . see why Sherardizing makes Sherarduct "galvanized conduit at its best."

Sherardizing is galvanizing at its best . . . Sherarduct is galvanized conduit at its best

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NATIONAL ELECTRIC PRODUCTS CORP. 50™ ANNIVERSARY 1905–1955

National Electric Products

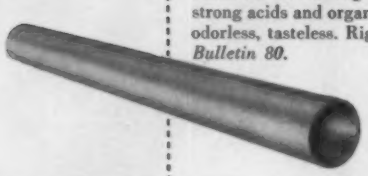
PITTSBURGH, PA.

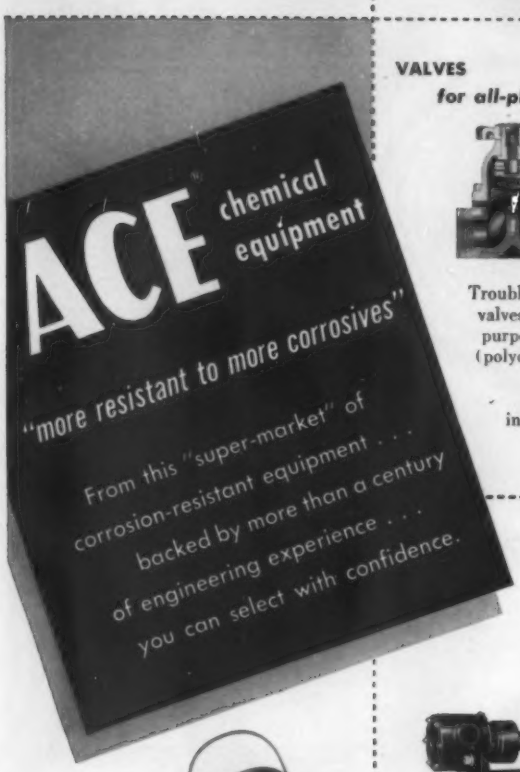
3 Plants • 10 Warehouses • 36 Sales Offices

For more facts circle 591 on Reply Card

TOUGH ACE-ITE PLASTIC PIPE

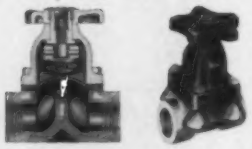
General-purpose moderately priced rubber-plastic pipe handles most common chemicals to 170 deg. F. . . . except few strong acids and organic solvents. Tough, odorless, tasteless. Rigid pipe ½" to 6". *Bulletin 80.*




ACE chemical equipment
"more resistant to more corrosives"
From this "super-market" of corrosion-resistant equipment . . . backed by more than a century of engineering experience . . . you can select with confidence.

VALVES

for all-plastic piping systems

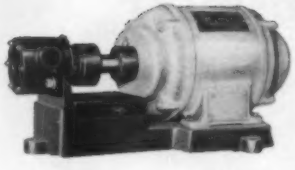


Trouble-free plastic diaphragm valves . . . choice of general-purpose ACE-ITE, ACE PARIAN (polyethylene) or ACE SARAN. Handles most corrosive chemicals and food ingredients. Sizes ½" to 2", 50 psi. at 77 deg. F. *Bulletins 80 and 351.*

ACE-HIDE ACID PAIL

Practically indestructible

Its made of a new rubber-plastic material that's tough, resilient, suitable for handling most acids and alkalis. 3-gal. size. Easy-pour, drip-proof spout. Also 1-qt. and 2-qt. dippers, hard rubber bottles, etc. Write for name of nearest dealer.



MIGHTY MIDGET

for pumping acids

Jabsco neoprene-impeller pump made of ACE hard rubber out-lasts, out-pumps anything in its pressure, size and price class. Capacity from 15 gpm. at 22 ft. head to 5 gpm. at 72 ft. head. *Ask for free Bulletin 97.*

ACE rubber and plastic products

AMERICAN HARD RUBBER COMPANY

93 WORTH STREET • NEW YORK 13, N. Y.

For more facts circle 592 on Reply Card

NEW PRODUCTS

(Begins on page 152)

with a putty knife. Industrial applications for Lab-Metal range from filling blowholes and sand holes in metal castings to building up a long-wearing finish on foundry patterns. Tests of such finishes are reported to show a worthwhile increase in resistance.

Lab-Metal takes many of its characteristics from its main ingredient—aluminum pigment supplied by Aluminum Co. of America. This pigment when compounded with the resin dries to form a surface which will not shrink, crack, chip or peel, it is stated, and which may be covered with paints, primers, lacquers or enamels. The solder itself may be filed, drilled, chiseled, tapped or ground, or sanded to a feather edge. Lab-Metal is reported to withstand temperatures up to 350 F or down to -40F, to have a tensile strength of 650 psi, a Rockwell E hardness between 4 and 8. It is claimed to be unaffected by mild acids, alcohols, toluene, ether, petroleum and petroleum solvents. Alvin Products, Inc.

30—INDUSTRIAL SWEEPER has power reverse

This power sweeper is available with three main broom sizes — 27, 36 and 48 in. in width. All sweepers are complete

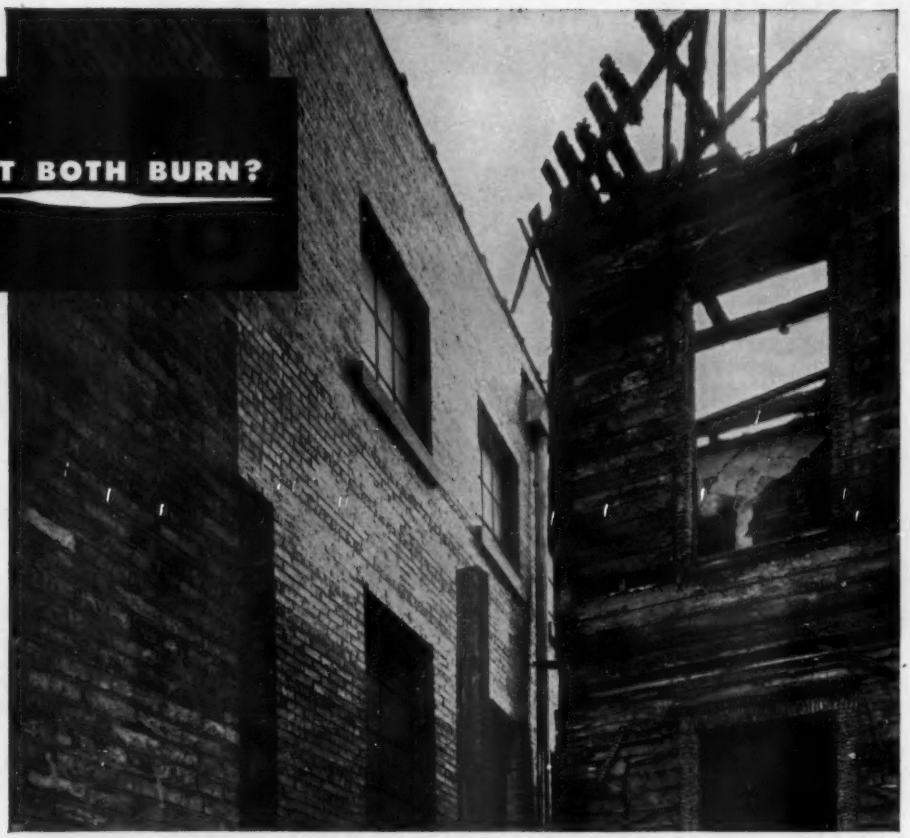
with dust control, 16 main brushes and power reverse. All three models are designed to pick up leaves, sand, metal turnings, metal chips, beer cans, paper, dust. Gutter brushes and riding sulky are available as optional equipment. Modern Power Sweeper Co.

31—UNIT HEATERS designed to resist corrosion

Manufacturer of the HCR Unit Heaters says they will considerably reduce maintenance and replacement costs in plants where unit heaters and steam specialties have had to be replaced frequently because of adverse operating conditions. These include installations where large volumes of high pressure steam are used in process work and where large amounts of make-up water with acid and oxygen-corroding agents are introduced into the system, and in certain low pressure steam systems lacking effective deaerating equipment or provision for adequate boiler water treatment.

These heaters are designed to provide maximum resistance to internal corrosion

WHY DIDN'T BOTH BURN?



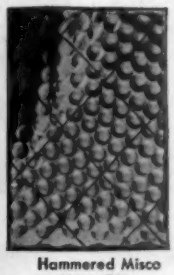
Mississippi Wire Glass Helps Protect Buildings Against Tragic, Costly Fires

When fire utterly gutted this building, it was unable to spread to the neighboring structure because Mississippi Wire glass windows, in metal frames, efficiently prevented windblown sparks and searing heat from reaching the interior. For though cracked by heat or smashed by a blow, wire glass tends to remain in the opening . . . continues to offer utmost protection at minimum cost.

And these same properties enable Mississippi Wire Glass (Approved Fire Retardant No. 32) to help bottle up fires and prevent them from roaring into a costly tragedy like that above.

Mississippi Wire Glass has saved many lives and millions of dollars' worth of property from fiery destruction. It is recommended for installation in windows, skylights, partitions, doors and in all other vulnerable locations where fire or breakage protection with daylighting is desired.

Fence out fire. Specify Mississippi Wire Glass . . . the original wire glass upon which the Underwriter's Standard was based . . . the standard today by which all others are judged. Available in hexagonal or Misco wire mesh in types for clear vision or diffusion, wherever quality glass is sold.



Hammered Misco Wire Glass

Smooth Rough Misco Wire Glass

Polished Misco Wire

Send today for free literature. Address Dept. 13.

MISSISSIPPI Glass COMPANY

88 ANGELICA ST. NEW YORK • CHICAGO — SAINT LOUIS 7, MO. FULLERTON, CALIFORNIA

WORLD'S LARGEST MANUFACTURER OF ROLLED, FIGURED AND WIRE GLASS

For more facts circle 593 on Reply Card

cut your field erection costs with complete hanger units

A sure way to cut your field erection costs is to use Blaw-Knox hangers and eliminators. Each is a complete packaged unit, ready to install. No expensive cutting, threading and assembling on the job.

In addition, these packaged units will cut your engineering and specifying time.

Each Blaw-Knox functional spring hanger, constant support spring hanger, rigid hanger assembly, overhead roller assembly, and vibration eliminator is designed for a specific purpose. Constructed to conform with the "code for pressure piping." Available in types and sizes to meet varying conditions.

Whenever you'd like some help, our experienced engineers are available to both design and make recommendations for your hanger requirements.

BLAW-KNOX COMPANY
Power Piping and Sprinkler Division
Pittsburgh 33, Pennsylvania

To get complete information, send for your copy of Bulletin 54.

BLAW-KNOX **PIPE HANGERS**

Complete line of functional spring hangers • constant support spring hangers • rigid hanger assemblies • overhead roller assemblies • supports • vibration eliminators . . . plus complete prefabricated piping systems for all pressures and temperatures

For more facts circle 594 on Reply Card

NEW PRODUCTS

(Begins on page 152)

through use of special alloys for condenser tubes. And the condensers are coated with a baked finish selected for resistance to salt air, humidity and mild acid or alkali atmospheres. HCR Unit Heaters are said to weigh no more than standard units of the same capacities and need no special supports. For replacement of standard units whose condensers have failed, HCR Unit Heaters are available without motors. Capacities of 12 horizontal delivery types range from 43,000 to 280,800 Btu/hr. Sixteen vertical delivery types have capacities of 140,300 to 609,600 Btu/hr and 10 "Power-Throw" (horizontal delivery draw-through type) units have 195,700 to 609,600 Btu/hr capacities. Bulletin 155-B gives further data. Modine Mfg. Co.

32—BAND SAW BLADES with positive rake angle

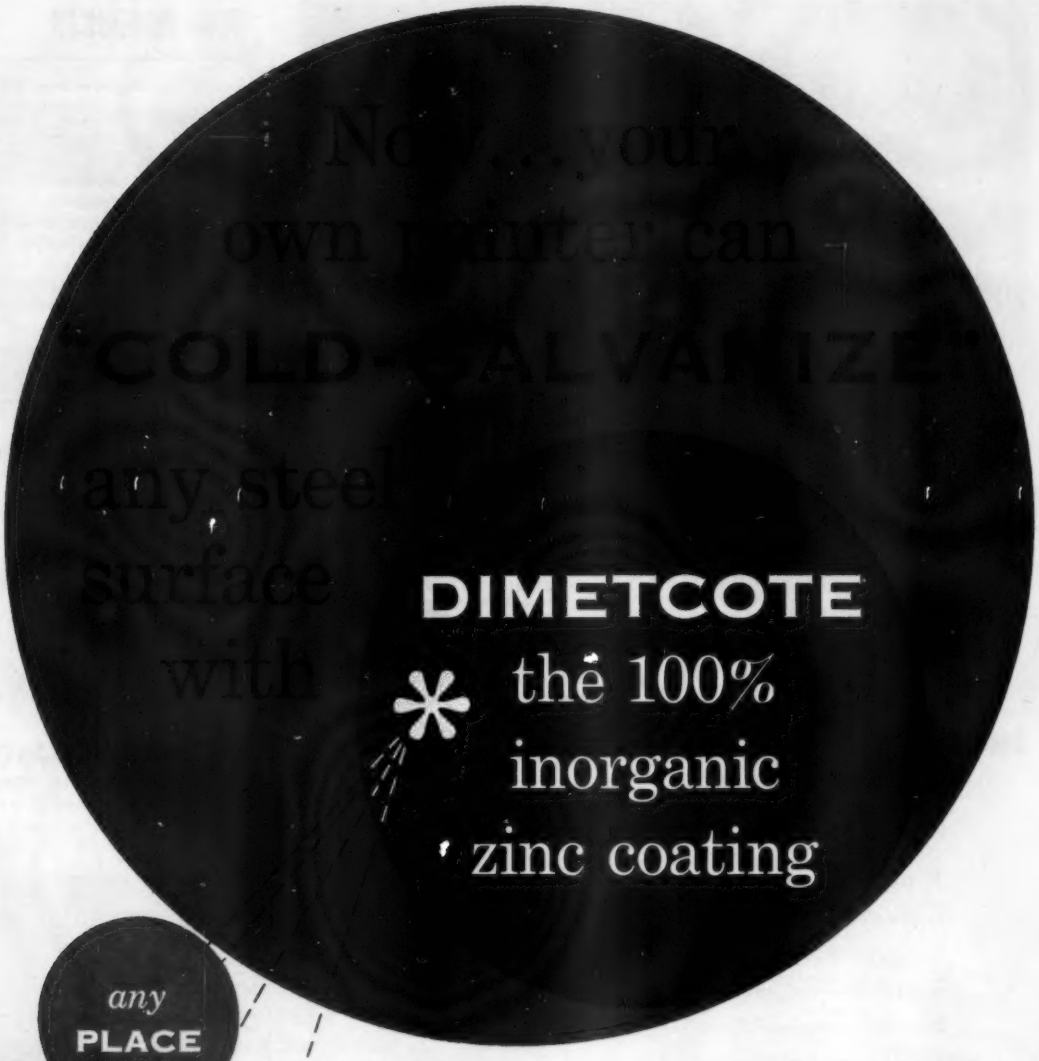
Hook Tooth Band Saw Blades feature teeth with a rake angle and a smooth blending of radii in the tooth gullet. The new design permits greater chip removal without increasing frictional heat. Other advantages cited are faster, easier cutting and longer blade life. The positive rake angle inclines teeth toward work which results in more bite with lower feed pressure, according to company. The blades are claimed especially suited for cutting wood, plastics, paper, non-ferrous metals, ferrous castings and mild steels having thick cross sections. W. O. Barnes Co., Inc.

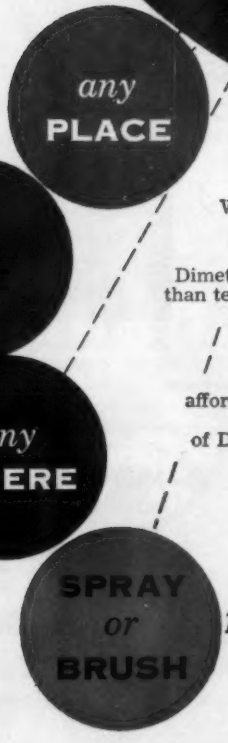
33—MOTOR GENERATOR with precise frequency control

In response to the increasing demand for 400 cycle power, this company announces development of a motor generator set consisting of a 60 cycle, induction motor of low slip design driving a 31.25 kva, 25 kw, 380-420 cycle generator. Exact frequency changes are accomplished, company says, through a simple hand crank adjustment. Design features announced include harmonic distortion of less than 2.9 per cent; fast voltage recovery; and voltage regulation to within ½ per cent. The unit matches requirements of precise frequency and voltage control along with ample reserve capacity. It is available on all standard, many special voltages. The Kato Engineering Co.

34—CONTROL CONSOLES for industrial sound systems

Announced as individually engineered for budget and coverage requirements of both large and small plants, these consoles come in two types. Type MI-14950, single channel, permits two simultaneous sound operations and provides coverage for up to 40 rooms or areas; Type MI-14951, dual channel, permits three simultaneous operations and coverage for up to 60 areas. Both, it is pointed out, can be used for individual, group, or





Dimetcote is absolutely unique. It is not a paint, it contains no oils, resins or any other organic materials, yet it can be applied by spray or brush. When Dimetcote is applied to steel, a reaction takes place at the surface which produces chemical bonding as well as physical adhesion. It is almost impossible to find the interface between Dimetcote and the steel.

Dimetcote has many unusual characteristics. It shows no visible change after more than ten years exposure to the most severe weather conditions – sun, heat, fresh and salt water. It is insoluble in all solvents and petroleum products. It is highly abrasion resistant, but if abraded through to bare steel, the coating will cathodically inhibit corrosion.

Now tanks and structures can be given the same protection that galvanizing affords, *plus salt water resistance.* Existing structures need not be dismantled and new structures can be coated either before or after erection. *Only one coat* of Dimetcote over a sandblasted surface is required to protect such structures as:

Tank Exteriors • Cargo Tanks in Tankers • Dam Gates • Structural Steel • Christmas Trees • Buoys • Floating Roof Tanks • Offshore Rigs • Water Tanks • Barges • Ship Decks • Stacks

Write for the Dimetcote Technical Bulletin today.

Follow the line of MOST resistance:

Amercoat® CORPORATION
Dept. LJ
4809 Firestone Blvd.,
South Gate, California

Evanston, Ill. • Kenilworth, N. J. • Jacksonville, Fla. • Houston, Tex.

For more facts circle 595 on Reply Card

Two Goulds 2 x 3—9 Fig. 3305 two-stage centrifugal pumps on boiler feed service. These pumps are available in five sizes with capacities to 1200 GPM, heads to 1000 ft.

7 *design features*

improve pump operating efficiency

Every one of these features is *standard* with this new Goulds Fig. 3305 two-stage centrifugal pump:

1. **Renewable stuffing box bushings.**
2. **Bearing housings sealed against moisture and dirt.**
3. **Cowl-type glands suitable for use with quenching liquids.**
4. **Stainless steel impeller keys.**
5. **Teflon water-seal rings.**
6. **Die-formed stuffing box packing.**
7. **Corrosion-resistant gland bolts.**

Together, these seven construction features give you, without extra cost, a quality of service that's unique in general liquid-handling pumps.

The Fig. 3305 offers other advantages, too. For example, you can choose either a conventional stuffing box or a mechanical seal—and change from one to the other at any time. Also, extensive interchangeability of parts helps keep your parts inventory low.

Bulletin 722.6 gives the complete story of Fig. 3305 advantages, including specifications, performance curves, and interchangeability charts. Write for a copy.

MEMBER HYDRAULIC INSTITUTE

Goulds PUMPS INC. Seneca Falls New York

ATLANTA • BOSTON • CHICAGO • HOUSTON • NEW YORK • PHILADELPHIA • PITTSBURG • TULSA

For more facts circle 596 on Reply Card

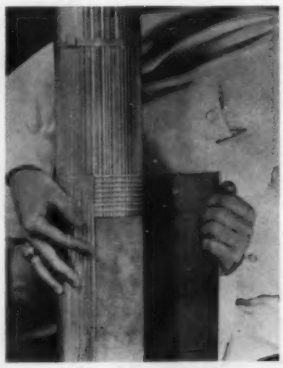
(Begins on page 152)

simultaneous coverage of all areas connected into the system, and permit communication between control desk and any remote area without interfering with programs being broadcast.

The single channel console is a self-contained unit housing all switches and control panels for room selection, radio, operation control, and intercommunication, and an AM/FM tuner for receiving broadcast stations. It has a 30-w program amplifier and inter-communication amplifier, both turret mounted, and permits simultaneous distribution of radio programs or studio-originated material and communication. Also self-contained, the dual channel console, permits simultaneous distribution of two separate programs, studio or broadcast to any combination of up to 160 outlets, as well as individual communication between control desk and any given remote area. This console has two individual program amplifiers, individual intercom amplifier, four low or high impedance microphone inputs, tape recorder input and other features. Both consoles provide single-switch operation for broadcasting emergency signals to all outlets. Radio Corp. of America.

35—ALUMINUM JACKETING with sealing feature

Lap-Seal is announced as a new development for this manufacturer's aluminum jacketing—a series of eight ribs rolled



into the underlapping edge to permit a more positive weather seal. It also saves labor, company points out, because the 2-in. ribbed edge eliminates measuring for circumferential lap. Childers Mfg. Co.

36—MOTOR features an inert gas-filled enclosure

This line of totally-enclosed, inert gas-filled motors in a wide range of ratings is announced for safe operation in hazardous gas-contaminated areas. Enclosures utilize air-to-water surface heat exchangers to remove heat of motor losses. They differ from water-cooled machines in that provision is made for maintaining an inert-gaseous atmosphere within enclosure. It is explained that

Here's the lowest cost

TRAMP METAL PROTECTION

ever offered...

...It's the New

DINGS

"Universal Series" METAL DETECTOR

The new Dings Universal Series Metal Detector will detect the presence of all magnetic metals in materials that pass through the Detector Search Coil. Metals are thus detected in material in any form, whether in raw or finished conditions, in bulk or pressed form, liquid or viscous, granular or fibrous state. Even weakly magnetic metals such as manganese steel can be detected by this new, adjustable intensity unit.

Extremely simple in design, installation and operation, the new Dings Metal Detector requires virtually no attention. It is merely necessary to plug the unit into any single phase outlet, place the Search Coil around conveyor belt, and turn on the switch . . . and you have provided protection against tramp metal damage to machinery and product quality at an extremely low cost.

DINGS ELECTRONICS, INC.
(subsidiary of DINGS MAGNETIC SEPARATOR CO.)
4766 W. Electric Ave., Milwaukee 46, Wisconsin

HERE ARE SOME OF ITS OUTSTANDING FEATURES

- Wide range of sensitivity settings
- Responds to manganese steel
- Remote location of control cabinet (30-ft. of cable furnished)
- Permanent stability (no adjustments necessary — not subject to temperature or humidity changes)
- Rubber-mounted search coil completely water-tight
- Control relay inside cabinet (for actuating alarm systems, reject devices, motor starters, etc.)
- Low power consumption
- Easily installed and operated, even by inexperienced personnel

Dings

Magnetic Separation Leader for over 50 years

MAIL THIS COUPON NOW

DINGS ELECTRONICS, INC.
4766 W. Electric Ave., Milwaukee 46, Wisconsin

Please rush further details about the new Dings Universal Series Metal Detector.

Name_____

Company_____

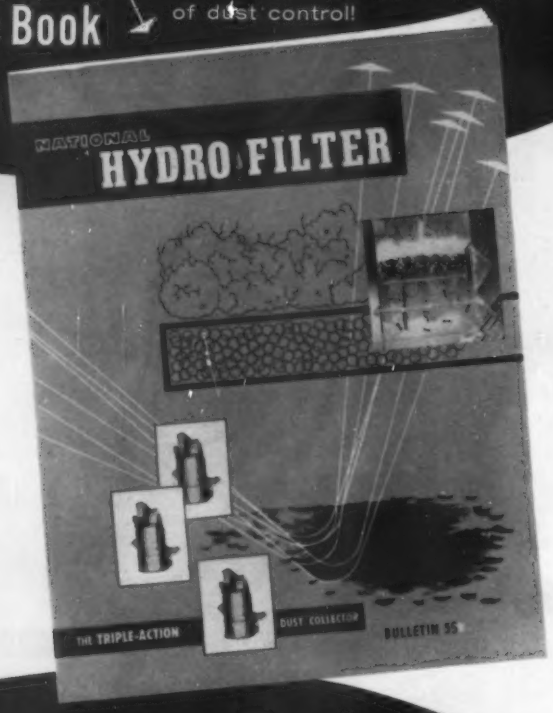
Address_____

City_____ Zone____ State_____

MD155

For more facts circle 597 on Reply Card

Here is the Book that describes an entirely new concept of dust control!



Here is the Collector . . .

that takes advantage of the most effective dust control principle known to man—that of simple filtration. In so doing it will promise three advantages, sought for wherever dust control or maintenance of wet type dust collectors is a problem:

EASE OF MAINTENANCE No moving parts to corrode.

CONSTANT EFFICIENCY over wide variations in load; —self cleaning on 24 hr. basis.

EXTREME SIMPLICITY makes it a tool that is easy to understand, operate and maintain.

WRITE FOR BULLETIN 55 today!

Details on operating principle, the 14 (500 to 25,000 cfm) models available and a record of test results with the Hydro-Filter are included.

NATIONAL HYDRO-FILTER Dust Collector Corp.

604 Machinery Hall Bldg., Chicago 6, Illinois

Subsidiary of National Engineering Company, Manufacturer of Simpson Mix-Mullers.

For more facts circle 598 on Reply Card

NEW PRODUCTS

(Begins on page 152)

under positive pressure, non-explosive gas inside motor keeps out voltaile ambient gases that could cause an explosion.

To keep gas replacement at a minimum, inert gas-filled stator yokes are constructed of plate steel with gas-tight welds at joints. Seals on shaft extensions are provided to prevent gas leakage outward along the shaft. A gas pressurizing manifold is used to maintain positive pressure within the housing. Inert gas-filled enclosures are favored, company points out, in applications requiring motors of considerable internal volume. These motors are rated 3000 hp, 2300 v, 1800 rpm. Allis-Chalmers Mfg. Co.

37—GAS BURNERS, six models, economically priced

According to manufacturer, these burners offer easily set, accurate air-gas ratios, high efficiency and high quality controls and are priced 30 to 40 per cent lower than company's previous models. In the new line are six gas and gas/oil burners in capacities from 720,000 to 8,600,000 Btu. The burners can be used for gas alone; for light oil (No. 2 grade) and gas; and a combination of heavy oil (No. 5 grade) and gas. Secondary air in these burners is furnished by the burner it is noted; the burner does not have to depend on stack draft. Air is controlled through the damper modulating between high and low fire. Cleaver-Brooks Co.

38—WALL BRACKET keeps the water cooler off floor

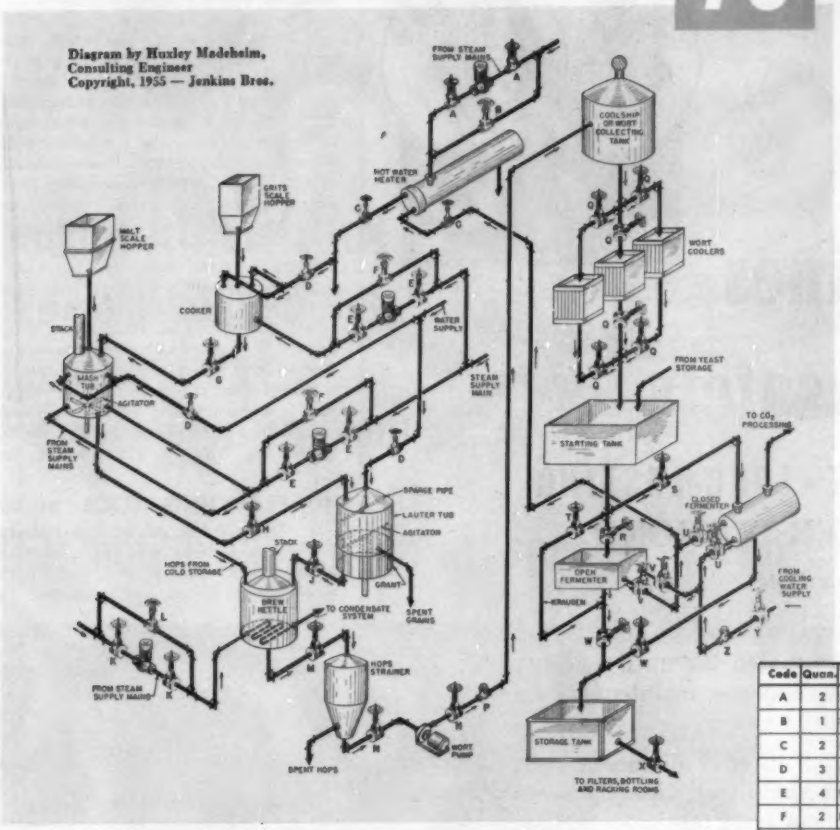
For use with this manufacturer's water coolers, this wall bracket suspends the cooler above the floor and thus simplifies the problem of keeping the floor clean around and under the cooler. Of importance to food processing and other plants where ultra cleanliness is important, this bracket offers a further advantage in permitting a cooler installation where there are pipes or other obstructions at floor level. Designed for easy installation, the Cordleyrac Bracket is held to the wall by four screws or bolts, and there are two tension bolts in an adjustable crossbar. Cordley & Hayes.

39—V-S DRIVE features built-in differential

This all-new infinitely variable speed transmission is reported to provide extreme accuracy of speed adjustment above and below the input speed. It is called the Speed Corrector because it is designed to provide the small but accurate speed changes often required on applications where one portion of machine must be accurately timed with respect to another with small adjustments needed due to variations—such as the stretch of a web of material between wind-up and intermediate rolls. A com-

JENKINS PRACTICAL PIPING LAYOUTS

76



How to plan piping connections for a GRAVITY-FEED MULTIPLE-STORY BREWERY

This piping layout is typical of installations in many breweries designed for gravity-feed processing, and the principal operations are briefly outlined.

Corn grits are cooked with water in the cooker, with enough added malt to convert and liquefy the grits. When the malt, which has been mixed with water in the mash tub, is properly steeped, the finished cook is dropped into it and the resulting mash thoroughly mixed.

Pumped into the Lauter tub, the mash grains settle to form a filter bed, from the bottom of which the clear liquid containing fermentable and unfermentable sugars is drawn. Extraction is increased by "sparging" with hot-water spray. This liquid, the "wort", flows by gravity to the brew kettle.

In the brew kettle, the wort is boiled with hops to add flavor and to clarify and preserve it. The hops are then strained off, and the liquid is pumped to the "coolship" tank to settle. It then goes through coolers to reclaim most of the residual heat, and on to the starting tank.

In the starting tank, the yeast is added, and the mixture flows to the fermenters, some of which are closed to collect the carbon dioxide gas for future use. After fermentation, the beer is cooled again and sent to storage tanks for eventual bottling and racking.

Consultation with accredited piping engineers and contractors, experienced in brewery design, is recommended when planning any phase of the various processing systems.

To simplify planning, select all the valves you need from the complete Jenkins line. It's your best assurance of *lowest cost in the long run.* Jenkins Bros., 100 Park Ave., New York 17.

Complete description and enlarged diagram of this layout free on request. Includes additional detailed information.

VALVE RECOMMENDATIONS
For details of valves to suit varying conditions see Jenkins Catalog.

Code	Quan.	Jenkins Valve	Service
A	2	Fig. 275 Bronze Gate	Shutoff steam to heater
B	1	Fig. 556-P Bronze Globe	Bypass to heater
C	2	Fig. 47 Bronze Gate	Shutoff water heater
D	3	Fig. 106-A Bronze Globe	Continuous water flow
E	4	Fig. 204 I.B. Gate	Process steam shutoff
F	2	Fig. 576-P Bronze Globe	Bypass water valve
G	1	Fig. 677-A Bronze Gate	Shutoff cooker mash
H	1	Fig. 677-A Bronze Gate	Shutoff finished mash
J	1	Fig. 677-A Bronze Gate	Shutoff wort to kettle
K	2	Fig. 204 I.B. Gate	Shutoff steam to kettle
L	1	Fig. 576-P Bronze Globe	Bypass to kettle
M	1	Fig. 677-A Bronze Gate	Shutoff wort line
N	2	Fig. 677-A Bronze Gate	Pump shutoff
P	1	Fig. 352 Bronze Swing Check	Prevent backflow
Q	6	Fig. 677-A Bronze Gate	Shutoff coolers
R	1	Fig. 677-A Bronze Gate	Shutoff open fermenter
S	1	Fig. 677-A Bronze Gate	Shutoff closed fermenter
T	2	Fig. 677-A Bronze Gate	Krausen line
U	2	Fig. 675-A Bronze Gate	Water to closed fermenter
V	2	Fig. 675-A Bronze Gate	Water to open fermenter
W	2	Fig. 677-A Bronze Gate	Shutoff storage
X	1	Fig. 677-A Bronze Gate	Shutoff rack & bottling
Y	1	Fig. 675-A Bronze Gate	Shutoff well water
Z	1	Fig. 352 Bronze Swing Check	Prevent backflow

JENKINS VALVES
LOOK FOR THE JENKINS DIAMOND
SINCE 1864
Jenkins Bros.

SOLD THROUGH PLUMBING-HEATING AND INDUSTRIAL DISTRIBUTORS
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men and machines move safely over • LOW-COST • LONG-LASTING A.W. SUPER-DIAMOND

Rolled Steel Floor Plate

Where safety and economy are "musts"—no other floor plate can match SUPER-DIAMOND's rolled steel ruggedness and easy maintenance for so low a cost.

At every step 40 steel diamonds guard constantly against skids and slips. This non-directional pattern floor plate fabricates easily . . . can be installed overnight . . . gives years of dependable safety under the heaviest industrial loads.

Mail coupon for full details on this low-cost, long-lasting rolled steel floor plate.

A.W. SUPER-DIAMOND ROLLED STEEL FLOOR PLATE

"The diamond in the rough . . . a gem of a flooring."

ALAN WOOD STEEL COMPANY
Conshohocken, Pa.

Please send A.W. SUPER-DIAMOND Booklet SD-30

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Other products: A.W. ALGRIP Abrasive Rolled Steel Floor Plate—Plates—Sheets—Strip—(Alloy and Special Grades)

For plants where oil, water and grease raise special problems of slipping accidents, we suggest a check on the special qualities of A.W. ALGRIP . . . the world's only abrasive rolled steel flooring.

A.W.

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NEW PRODUCTS

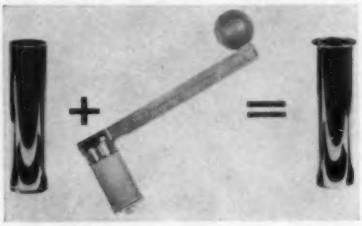
(Begins on page 152)

pact unit, it incorporates both variable speed drive and built-in differential.

For most applications, the transmission has a built-in gear reduction, single or two-stage helical or worm gear reducer, so the range of output speed is both above and below the input speed. For applications where the input speed is low or variable, the transmission has a spring loading device. Entire assembly of the Speed Corrector—including transmission, control, built-in reducer, and built-in motor, if desired—can be mounted with only four bolts. And because it delivers several times the horsepower output of company's standard wide range model of the same size, the Speed Corrector can be had at less cost per horsepower. It can be had with a variety of special controls—remote mechanical, electrical, pneumatic, or hydraulic—to provide automatic speed correction in response to a control signal. Bulletin 900 gives data. Graham Transmission, Inc.

40—FLANGING TOOL makes tailpieces of scrap tubing

This quick-flanging tool converts 1½-in. scrap tubing into perfect flanged tail pieces in just 10 sec, it is announced. The



tool is claimed simple to operate, too—just oil or grease inside edge of the tubing and clamp into vise, then turn the handle, gradually forming the flange by putting pressure on the handle knob. J. A. Sexauer Mfg. Co.

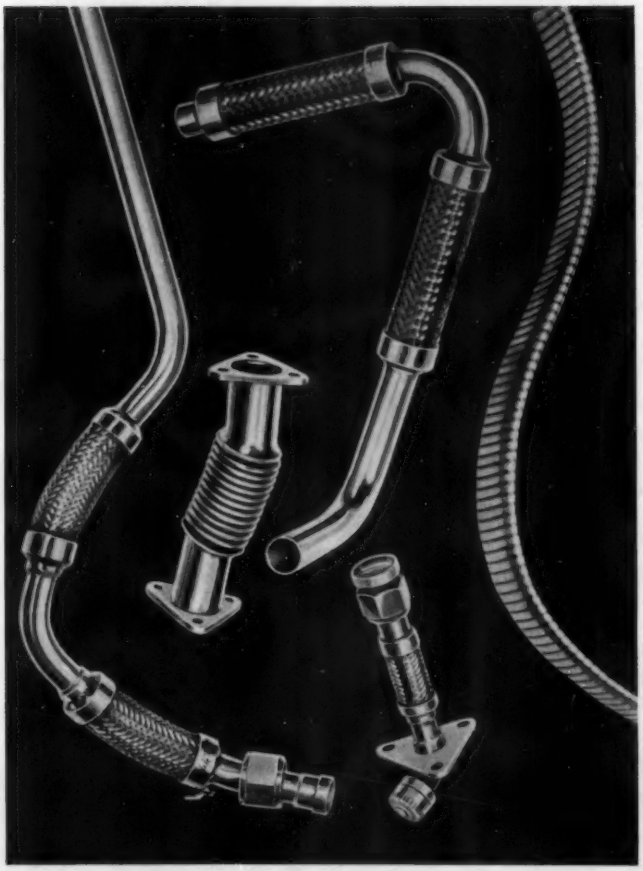
41—PUSHBUTTON SWITCH has illuminated buttons

This pushbutton switch, 31PBI, has an indicating light as an integral part of the button itself. Small and compact in design, it is offered for use in electronic and other a-c or d-c applications using low voltages. It is said to be easily wired and may be panel mounted in groups on 1-in. centers. Its overall length is $3\frac{3}{32}$ in.

The switch is provided with a socket inside the pushbutton head for a single-contact miniature bayonet lamp. Incandescent bulbs should be used with 6 to 28-v d-c circuits and neon bulbs, with a resistor, on 115-v circuits. Lamps and pushbuttons are not supplied with the switches. Removable translucent pushbuttons, keyed to prevent rotation, are available in red or frosted white for use with incandescent bulbs, and in clear plastic for use with No. 51 neon bulbs.

Standard AMERICAN flexible connectors like these may solve your problem . . .

If not, we'll design a "special" at no extra cost



What's your connector problem? Vibration? Movement? Misalignment? Cramped space? Want help solving it? Tell us what material you have to convey, temperatures and pressures involved, kind of end fittings you need, and the special conditions which will affect service. Our engineers will be glad to work with you. *The American Brass Company, American Metal Hose Branch, Waterbury 20, Conn.* In Canada: *The Canadian Fairbanks-Morse Co., Ltd.*

55178

WHEREVER CONNECTORS MUST MOVE

AMERICAN

flexible metal hose and tubing

an ANACONDA® product

PLE

FREE CATALOG . . . 16 pages of data on the complete line of American Flexible Metal Hose and Tubing, including fittings. Mail coupon to The American Brass Company, American Metal Hose Branch, Waterbury 20, Conn.

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COMPANY.....

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For more facts circle 601 on Reply Card

In Hazardous or Coded Areas Specify RESOLITE FIRE-SNUF The Only Fiberglass Panel Labeled by Underwriters'

Fire-Snuf Panels are the *first* and *only* translucent, fiberglass-reinforced panels to be listed by Underwriters' Laboratories, Inc. They carry the UL label as evidence that they have and are continuing to meet Underwriters' rigid specifications.

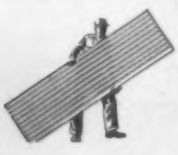
They should be specified for skylights, sidewalls, partitions and glazing where fire hazards are unusual or codes call for a flame spread rating of below 75. This rating is equivalent to the Building Officials Conference of America (BOCA) classification of "slow burning" or "fire retardant." These panels are self-extinguishing and will not support combustion.

Complete test reports on the fire hazard classification of Fire-Snuf by Underwriters' Laboratories Inc., are available from the manufacturer on request.

Made with fire-retardant Hetron* polyester resin, Fire-Snuf panels retain all the best features of standard Resolite—shatterproof safety, strength, translucence, stability and load bearing characteristics.

*® Hooker Electrochemical Co.

Fire-Snuf is molded in flat panes for glazing and in all standard Resolite corrugations in lengths up to 13 feet and widths up to 42 inches. For additional information consult your distributor or contact



RESOLITE Corp.
Box 517, Zelienople, Pa.
Office and Warehouse, CHICAGO, ILL.
Export Office, HOUSTON, TEXAS
Distributors in principal cities, U. S. and Canada
For more facts circle 602 on Reply Card

NEW PRODUCTS

(Begins on page 152)

A terminal block is provided and power to turn on the indicator light when the switch is operated must be picked up from the circuit being switched by a direct connection or by using a relay. The switch has one single-pole, double-throw switching unit. Micro Switch Div., Minneapolis-Honeywell Regulator Co.

42—TIP CLEANERS come in larger size kit

As a greater convenience to welders, the Master Set of Wypo Tip Cleaners contains all sizes found in company's Standard and Jumbo Sets, enabling the welder to have 21 sizes at his finger tips. This includes the 12 in the smaller set which clean 27 drill sizes, Nos. 75 to 49 inclusive, and the nine in the Jumbo Set which clean 19 drill sizes, Nos. 48 to 30 inclusive. Maitlen & Benson, Inc.

Use the Reader Service Cards provided on pages 235-236 to ask for more information on these products. Circle item numbers of products in which you are interested.

43—AUTOMATIC MACHINE cold spins cones, tubes

The Hydrospin is a heavy-duty machine for cold spinning cones and cubes. The standard unit is built in a 42-by-50 in. size in plain and duplex models. The machine is designed to cold spin regular contoured hollow cones up to 42-in. diam by 50 in. long. Roll force, which may result in unit pressure to 400,000 psi, is sufficient to roll a ¾ in. flat disc of AISI 4130 steel down to a 60-deg included angle straight-wall cone in one pass, says company, and parts may be spun from flat disks, preformed blanks or rings of virtually any ductile metal. Mill-rolled sheet and plate stock, forgings and castings may be used for Hydrospinning. It is claimed that besides giving the part the desired shape, Hydrospinning usually increases tensile strength and hardness of the material as well as its resistance to fatigue failure.

The machine consists primarily of a heavy, welded steel bed which supports headstock and main slide units. Tee slots in the bed permit universal positioning of main slides which support the roller carriers. The latter are hydraulically powered and independently controlled and may be traversed simultaneously or individually. When production warrants, the machine may be set up to operate through a Hydrospinning cycle in which the movements of the saddles, cross slides and talkstock and starting and stopping of the spindle are automatically controlled. To facilitate setups, the machine

New Sarco Thermodynamic Steam Trap practically eliminates maintenance!

Only moving part—a hardened Solid Stainless Steel Disc—practically wear-proof!

SOME OF MANY ADVANTAGES

1. Same trap for all loads and pressures 10-600 psi.

2. Closes tight on no load.

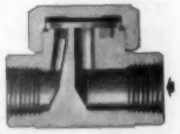
3. Operates against back pressures up to 50% of inlet pressure.

4. Not affected by superheat, water-hammer, vibration, corrosive condensate.

5. Smallest inventory of spare parts.

SIMPLICITY—to the Nth degree!

No valve-closing mechanisms to wear or stick. No critical clearances to choke. No gaskets to leak. Three simple parts...machined from stainless steel bar stock. Only one moving part.
What could be simpler?



SARCO COMPANY, INC.

2133-B

Sarco Company, Inc., Empire State Bldg., New York 1, N. Y.

Please send me: ☐ Bulletin 255-44
☐ A Sarco Thermodynamic Steam Trap for 60-day trial. Size_____ for installation on_____

NAME_____

FIRM_____

ADDRESS_____

CITY_____ STATE_____

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YOU'LL GET MORE FOR EVERY DOLLAR WITH

STANDARD LO-HED

THE STANDARD LO-HED HOIST is just what the name implies . . . a *standard hoist . . . quantity-produced.* And because of this, it's always ready for delivery straight from stock, and gives you extra features at no extra cost.

What's more, Standard Lo-Hed is as modern as tomorrow in both engineering and materials. Its welded steel chassis brings the perfect combination of rigidity and light weight. Its straight line spur gear drive does away with worm-wheels, extended shafts and split gear combinations. Its balanced design is ideal for monorail, crane and stationary service . . . unapproached for simplicity and ease of maintenance. Lower limit safety switch is a standard feature . . . no charge.

Standard Lo-Hed Hoist is available in 2- and 3-ton capacities. Write for full information—or—if you have special requirements, ask for literature about the Customized Lo-Hed. American Engineering Company, 2503 Aramingo Ave., Philadelphia 25, Pa.

FAMOUS CUSTOMIZED LO-HED

. . . For low headroom . . . for lifting capacity from ¼ ton to 12 tons . . . a Customized Lo-Hed Hoist will bring new standards of speed, efficiency and economy to your materials handling operations.

AMERICAN ENGINEERING

COMPANY

Philadelphia 25, Penna.

Affiliated Engineering Corporations, Ltd., Montreal 16, P. Q.
Bawden Industries Ltd., Toronto 3, Ont.

AE Products are: Marine Deck Auxiliaries, Hele-Shaw and Hydramite Fluid Power, Lo-Hed Hoists, Lo-Hed Car Pullers, Taylor, Perfect Spread and Vibra-Grate Stokers.

For more facts circle 604 on Reply Card

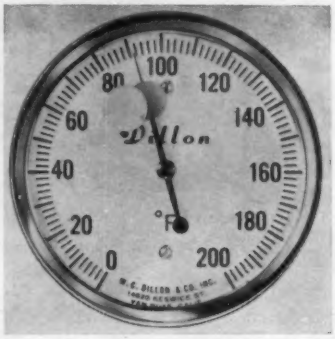
NEW PRODUCTS

(Begins on page 152)

may be operated by pushbuttons. Depending on spinning requirements, the Hydrospin may be equipped with a 50 to 60 hp infinitely variable speed drive to the heavy duty spindle. Available for use with the Hydrospin are an hydraulic contour tracing attachment, turning attachment and mandrel grinding attachment. Publication M-1873-2 gives details. Process Machinery Division, The Cincinnati Milling Machine Co.

44—THERMOMETER SIGNALS temperature variations

The Signal Eye Thermometer is designed to give a warning signal that tells operator, even from a distance of 50 ft, when normal temperature readings rise or fall. It is accomplished by a bright red disc affixed to pointer. An opaque disc of the



same diameter is attached to disc glass over the spot where it coincides with the red disc. Slightest temperature variation causes pointer to fluctuate above or below opaque circle, revealing red signal eye.

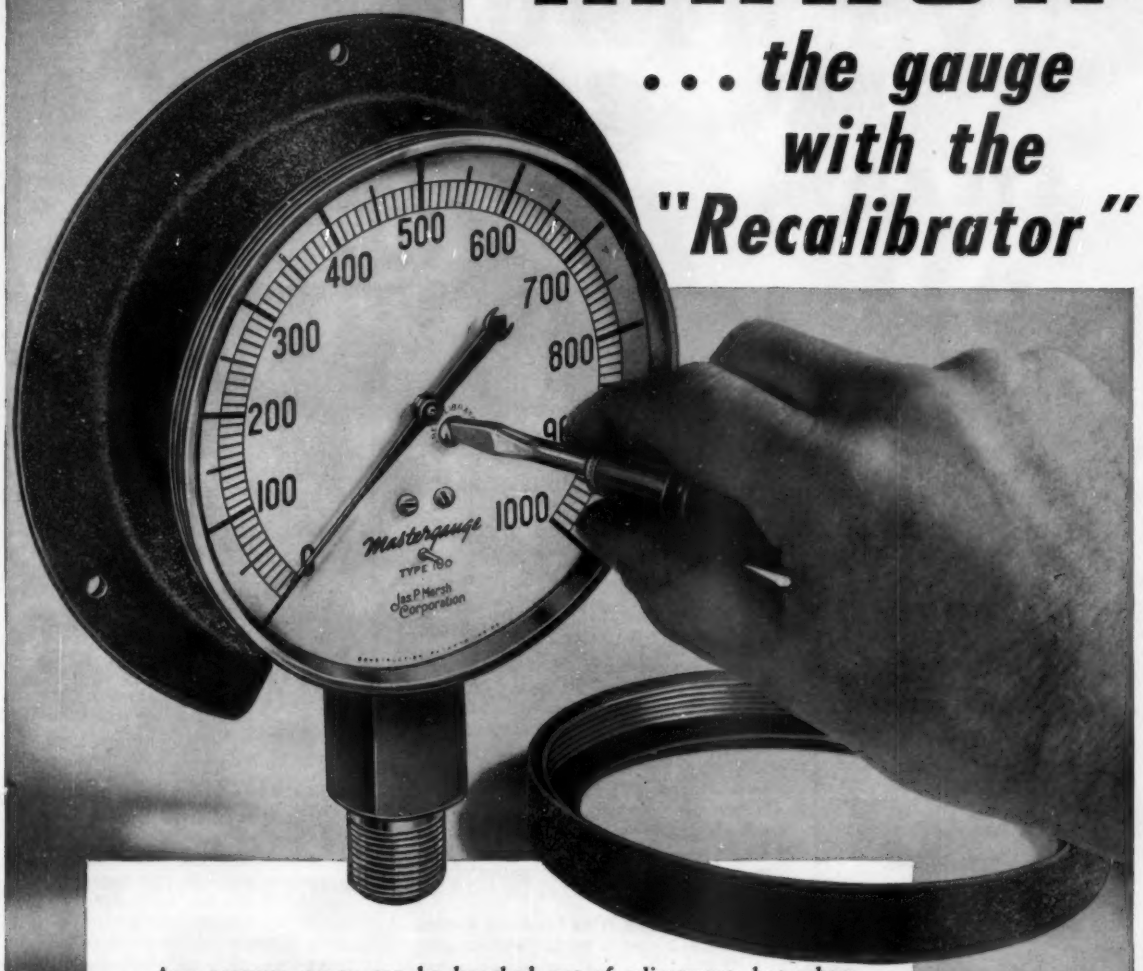
These thermometers are usually used in places where height or distance make it impractical to read the actual temperature and where it is important only to know that it is off norm. Opaque disc can be repositioned by operator should a new standard temperature be selected. Thermometers are available in 3- or 5-in. diam dial sizes and in stem lengths from 2½ to 72 in. Temperature ranges from -40 to 160 F, with intermediate ranges and a high of 200-1000 F.; also from -10 to 110 C and up to 0- 300 C. W. C. Dillon & Co., Inc.

45—PORTABLE HEATER is low priced, indirect fired

The Thrifty Portable Air Heater, scheduled to make its appearance this fall, is reported to make available for the first time an indirect fired air heater in the low priced field—selling for less than $300. Heater is fired with ordinary fuel oil, but will burn gasoline just as efficiently when outdoor temperatures fall below firing range of fuel oils. Heating capacity is manually controllable from 50,000 to 170,000 Btu per hr. Heated

MARSH

... the gauge with the "Recalibrator"



Any pressure gauge can be knocked out of adjustment, but when it's a Marsh Gauge you can quickly correct it with the twist of the "Recalibrator" screw.

This is not only the handiest way to correct a gauge; it is also the best way. Conventional methods of adjustment simply compensate for the error. The "Recalibrator" corrects the relationship between the movement and the bourdon tube—actually *does re-calibrate* the gauge.

MARSH INSTRUMENT CO. *Sales Affiliate of Jas. P. Marsh Corporation* **Dept. W, Skokie, Ill.**
Marsh Instrument & Valve Co. (Canada) Ltd., 8407 103rd St., Edmonton, Alberta

Marsh products include a full line and range of gauges in pressure, compound, altitude, hydraulic, sprinkler, ammonia, retard, test and diaphragm types. Dial thermometers in rigid stem and remote reading types. Ask on your letterhead for new catalog just off the press.

For more facts circle 605 on Reply Card

...Why don't they get
WING Revolving Heaters?

Are your workers subjected to steady blasts of heat from suspended unit heaters with fixed discharge outlets? Are some uncomfortably hot while others are just as uncomfortably chilled? Wing Revolving discharge unit heaters are the logical solution to these important personnel problems. The heated air is discharged from slowly revolving outlets and this warm air stream caresses the workers in its circular path for a few seconds at a time, just enough to give a sensation of live, invigorating warmth.

Factories heated by Wing Revolving Heaters are pleasant places to work. Convince yourself—try one.

Write for a copy of Bulletin HR-6A. Use the coupon.

L. J. Wing Mfg. Co. 177 Vreeland Mills Road, Linden, N. J.

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L. J. Wing Mfg. Co., Linden, N. J. PE-10
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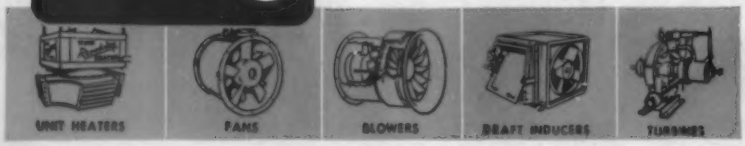
Wing



For more facts circle 606 on Reply Card

NEW PRODUCTS

(Begins on page 152)

ventilation air is discharged under pressure by means of an electric motor driven blower. Heater may be used indoors or out, and canvas ducts can be used to spot heat where desired. Combustion gases can be separately vented whenever safe practice requires that prevention. Company's line of portable air heaters now provides three different models—The Thrifty, Utility, and De Luxe—to satisfy various needs for portable heat. Heaters are all indirect fired—the products of combustion are positively isolated from the heated, ventilation air, manufacturer says, assuring safe operation. Additional safety devices guard against overheating, power failure, flame failure. American Air Filter Co., Inc.

46—PNEUMATIC SAW-FILE is light, versatile tool

The Speed-Nu-Matic Saw and File is announced as a very light tool, approximately 3¾ lb, portable for instant attachment to air supply, requiring only 90 lb pressure and consuming about 5 cu ft air per min. The tool has a variety of usage, being available for close work on-the-job filing and sawing of iron, steel, aluminum, wood and other materials. Its adjustment permits a stroke of ¼ to 1¼ in. for dead-end sawing and filing. The front barrel will rotate through 360 deg for scroll and circle cutting. The saw will use a regular hack-saw blade and has ¼ in. hole in the chuck for bench filing. Special blades which are 4 in. deep and made of molybdenum are available in 14, 18 and 32 tooth. The tool requires no attachments, is nickel finished. R and G Engineering Co.

47—SWITCHGEAR, compact, low voltage type

This metal-enclosed switchgear is introduced in a uniformly three-high frame arangement through 3000 amp air circuit breaker ratings for application at 600-v and below. Compact design is said to be particularly notable in the type KD for heavy-duty, 2000 and 3000-amp service. The devices can be fully isolated in steel compartments only 30 in. wide, 30 in. high, with minimum frame depth of 58 in. The 3-high arrangement affords optimum use of space, it is pointed out, convenience for connecting cables and accessibility for control. I-T-E Circuit Breaker Co.

48—SOUND DETECTOR finds defects in machinery

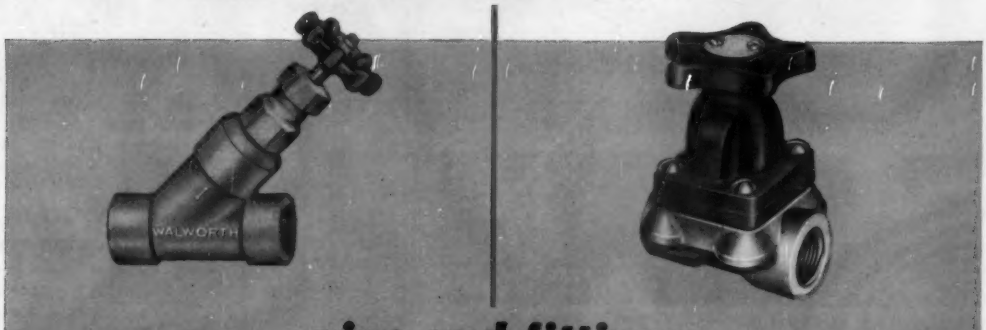
An improved listening device, the Engineer's Sound Detector is claimed to enable detection of the smallest internal defects in moving machinery without taking the equipment out of service. It amplifies normally inaudible defect-caused noises, says company, and lets you locate broken, loose, worn or bent parts in reciprocating engines, motors, gear boxes,

Iron... Steel... Bronze...

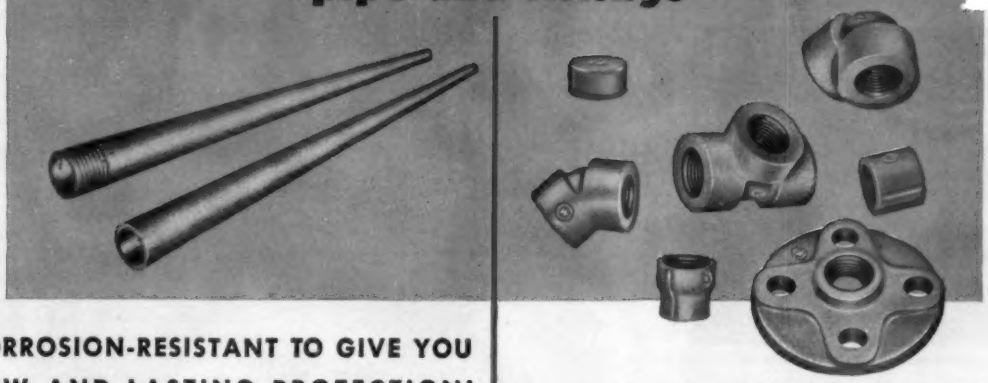
Special Alloys **and now...** *PLASTICS!*

WALWORTH PVC

globe and diaphragm valves



pipe and fittings



CORROSION-RESISTANT TO GIVE YOU NEW AND LASTING PROTECTION!

Walworth rigid plastic polyvinyl chloride valves, *and* fittings provide safe, trouble-free lines to handle wet and dry hydrogen gas—sulphur dioxide—dilute nitric acid—sulphuric acid—natural gas—sugar juice—milk—vinegar—tanning solutions and literally scores of other corrosive as well as noncorrosive materials in the chemical, petroleum, pulp, paper, food and other industries.

Walworth polyvinyl chloride valves *and* fittings are molded to the *same* rigid Walworth specifications by the *same* molder—the General American Transportation Corporation—of the *same* basic material,—Geon rigid vinyl from B. F. Goodrich Chemical. Rigid plastic pipe of the same materials and made by the same molder is also available. Consistent performance is therefore assured throughout *all*-Walworth PVC piping systems. Plastic valves, fittings, and pipe offer the following advantages:

1. **Exceptionally resistant to most salts, alkalis, and nonoxidizing acids at temperatures below 150° F.**
2. **High burst strength and impact resistance.**
3. **Nontoxic, and extreme low flammability.**
4. **Easy to install.**

Get the complete Walworth PVC product story. Write for brochure containing detailed specifications, characteristics, and application data.

WALWORTH

valves . . . pipe fittings . . . pipe wrenches

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WALWORTH COMPANY OF CANADA, LTD.

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EXTEND GEAR LIFE

with UCON synthetic lubricants

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Here's an actual case:

Identical bronze ring gears, driven by alloy-steel worms, in speed reducers that couple 75-hp. motors to rotary pumps . . .

. . . after 6 months on UCON Lubricant LB-1200-X.

. . . after 1 year on UCON Lubricant LB-1200-X.

. . . after 6 months on petroleum oil.

WHY these outstanding results?

Because UCON Lubricants have

HIGH

- *film strength*
- *resistance to sludging and carbonization*
- *viscosity indexes*
- *wear resistance*

Find out how UCON Lubricants can help you solve your tough lubrication problems. Return the coupon *today*.

UCON LUBRICANTS are products of:

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For more facts circle 608 on Reply Card

NEW PRODUCTS

(Begins on page 152)

compressors, pumps. It is also reported useful in determining efficiency of steam traps and locating leaks in underground piping.

Resembling a doctor's stethoscope the Engineer's Sound Detector utilizes dual detectors to transmit sounds to one or both ears as desired. Each detector contains both a pick-up diaphragm and an amplifying diaphragm to provide maximum sound vibrations. The twin detector feature makes possible listening to two different points at a time. A pair of extension rods are furnished with the device for reaching into remote places, and an interchangeable bell stethoscope is also supplied for detecting pressure or vacuum leaks around head gaskets, manifold, etc. The standard model detector sells for around $15.00—a de luxe model for around $20.00. Burke & Co.

49—PLASTIC INSULATION for welding equipment

Costly shorts (shorting out of equipment) that plague the electric spot welder and result in poor welds, work stoppages and part rejects have reportedly been greatly reduced by the introduction of Amazi Welding Insulation—a plastic insulation

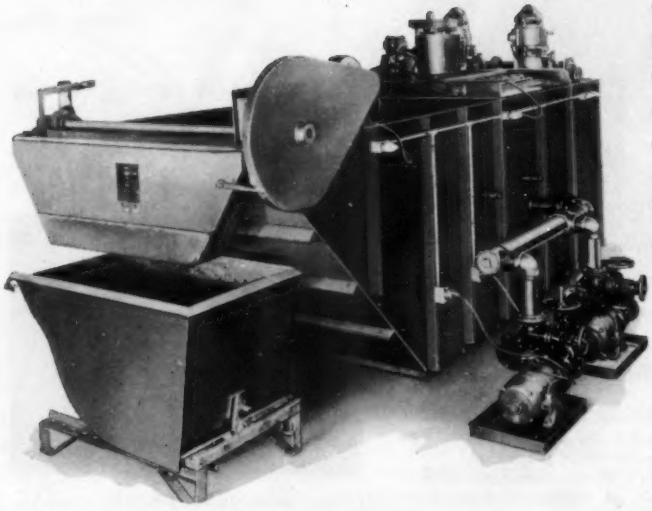
for welding equipment (shown in photo in near perfect condition after 14 hr of welding). Application of the insulator to welding points, point holders and other trouble spots—where metal being welded is apt to come in contact with equipment—results in a smooth, non-peeling, plastic surface of cement-like hardness, company points out, that is not brittle and does not conduct electricity. Company claims it has more adhesiveness than many plastics known today. It adheres to flat or round surfaces, to metal, plastic and other surfaces. Easy to apply, application takes about 7 min, insulation is available in 1-, 10- and 50-lb containers. Amazi Reliner Corp.

50—HEAT EXCHANGER cools by evaporation

Designed to provide water saving in industrial cooling and give close control of temperature (within 2 F.) the Panel Casing Aero Heat Exchanger cools by evaporation and obtains temperature control by modulating use of outdoor air. Fluid to be cooled flows through two parallel mounted coil sections, both kept drenched with a water spray. Part of this water evaporates, the balance is recirculated. Air enters through dampered intakes about the coils, travels downward through the sprays and enters a central plenum, at which point entrained mois-

HOFFMAN'S ENGINEERED SYSTEMS designed to do the tough jobs in industry

KEEP COOLANTS CLEANER • REDUCE WHEEL DRESSING
CUT COSTS WITH A HOFFMAN FLOTATION SYSTEM



If your plant is a volume user of soluble oil and water coolants—20 gallons or more—there's money for you in Hoffman coolant clarification systems.

The Hoffman fully automatic, unattended flotation unit is connected to every machine sump, collects coolant after it flows *once* over the work—removes every trace of grit, muck, or chips—and returns it to the coolant supply.

Cutting tools stay sharp, and grinding wheels stay clean longer, work faster and closer, and there is far less down time for maintenance. Coolant replacement practically disappears. *Production increases!*

In the Hoffman clarifier, an exclusive aeration-flotation system lifts the "fines" to the top in froth. Mechanical skimmers carry this foam into settling tank where solids settle to the bottom. The sludge is dragged up an incline for drainage, and is discharged in near-dry state.

To learn how much dollar return your plant can get through Hoffman coolant clarification . . . and through other industrial filtration systems . . . write for technical bulletins and a Hoffman Filtration Engineer's survey. No obligation.

U.S. HOFFMAN MACHINERY CORP.
INDUSTRIAL FILTRATION DIVISION
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Multistage Centrifugal Blowers and Exhausters
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ORDNANCE EQUIPMENT DIVISION

Special Pneumatic Conveying Systems
High Efficiency Centrifugal Separators
Stationary and Portable Vacuum Cleaning Equipment
Process Equipment
Pneumatic Systems for Radioactive Materials

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You can solve your **tough** corrosion problems by using Bitumastic® Coatings

Here is a porous surface being protected by Bitumastic® No. 50. This heavy-duty coating—applied over a primer—builds up a barrier that cannot be penetrated by moisture and corrosive elements in the soil.

TOUGH CORROSION PROBLEMS can be solved, but not by using ordinary paints or conventional protective coatings. For long-term protection, it takes *specialized* protective coatings . . . the Bitumastic Coatings Koppers makes.

Bitumastic Protective Coatings are specially formulated from a tar-pitch base* that is, for all practical purposes, impervious to moisture. These coatings keep moisture away from exposed metal surfaces . . . and that's the *best* way to stop corrosion.

With tough, durable Bitumastic Protective Coatings, a thickness up to eight times that of ordinary paints can be obtained in one application. Where other factors are equal, the *thicker* the coating the *longer* the period of protection.

Send for a set of free booklets describing the family of Bitumastic Protective Coatings. At the same time, tell us about *your* corrosion problems so that we can suggest a satisfactory solution. There is no obligation, of course.

**Hi-Heat Gray is a non-coal-tar vehicle and metallic pigment.*

KOPPERS COMPANY, INC.
Tar Products Division, Dept. 1023-T Pittsburgh 19, Pennsylvania
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MADE ONLY BY KOPPERS
BITUMASTIC PROTECTIVE COATINGS
SOLD THROUGH INDUSTRIAL DISTRIBUTORS
KOPPERS ®

For more facts circle 610 on Reply Card

NEW PRODUCTS

(Begins on page 152)

ture is eliminated. Air then moves upward and a propeller fan ejects it into the atmosphere.

Fluid in the cooling coils is cooled to a point close to the atmospheric wet bulb temperature. About 1000 Btu are transferred, through the wet coil surface to the air stream, for every pound of water evaporated, says company, and action of the air recirculation system holds temperature constant. Cooling capacity varies directly with heat input load. If heat is required, instead of cooling, it is provided with steam or electricity by a heater in the spray water tank. It is pointed out that much expense is avoided with this heat exchanger because it is designed to be assembled on the installation site. Since the casing is shipped as flat panels, the ratio of space to weight and freight costs are lower. This heat exchanger may be installed anywhere, but the usual location is outdoors, on ground or on a roof. Four sizes afford capacities from 7,000,000 to 18,000,000 Btu/hr under standard conditions. Niagara Blower Co.

51—LEVERAGE DEVICE for use on spray cans

Jiff-O-Jet snaps on and off any thumb-operated spray container in a jiffy and makes it work like a spray gun. It serves

to keep hands and fingers away from the spray container nozzle. The attachment has trigger-action and a pistol-grip handle which makes it easy to direct the spray where needed. It retails for less than a dollar. Penn Square Products Co.

52—DEBURRING TOOL has greater shear action

A newly engineered Nobursink is announced for fast and economical deburring and chamfering of openly accessible hole faces. The new tool, with higher rake angle is claimed to produce a greater shear or shaving action and afford a longer life between regrinds. This shaving action is accomplished with a minimum of pressure, says manufacturer, and consequently a secondary burr is not developed. The circular radial relief form of clearance at the cutting edge serves to support the cutting edge against wear and chippage.

The Nobursink uses a two-piece construction permitting cone faces to be cy-

PHYGON-XL is a low-cost and effective control for the most troublesome nuisance organisms in water—Algae.

Algae in an industrial water system can have far reaching effects on acidity, on outlets, inlets, filters and pipes in a distribution system. Use Phygon-XL to eliminate these troublesome factors. Added directly into the system at a rate of four pounds per million gallons of water, PHYGON-XL reduces over-all purification costs and the frequency of cleaning or back-washing filters.

Using PHYGON-XL to supress blue-green Algae blooms in lakes, ponds and reservoirs, also provides an opportunity for the vigorous growth of helpful aquatic plants. It can be mixed with water and applied as a spray over the area to be treated—about one to five pounds of PHYGON-XL per acre of water surface.

You'll find PHYGON®-XL is: effective, easy to use, and inexpensive. Write, wire or phone us if you are unable to locate an immediate source of supply.

Naugatuck Chemical

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US RUBBER

producers of seed protectants, fungicides, miticides, insecticides, growth retardants, herbicides: Spergon, Phygon, Aramite, Synklor, MH, Alanap, Duraset.

For more facts circle 611 on Reply Card

LAMSON ELECTRONICALLY SORTS 18 PRODUCT LINES-

AT LEVER BROS.' Hammond, Ind. plant, a Lamson automatic sorting conveyor system operates 3 shifts per day . . . sorting 6 of 18 product lines at any one time. This system is the first of its kind . . . hung from the ceiling utilizing the air rights.

A Single Lamson Conveyor delivers cartons of soap and soap powder from the mixed manufacturing area to the warehouse . . . a considerable distance.

The sorting devices operate from this conveyor. Each sorting device consists of an electronic identifying mechanism and the mechanical diverting equipment. The identifying mechanism, similar to a scanning device, selects each carton by a pre-printed mark. When the mark changes the intensity of reflected light, it sets-up an impulse which identifies the carton to be deflected. This impulse actuates the mechanical diverting equipment which moves the carton sidewise onto a spur feeding a pallet loader.

Lamson engineering "know-how" has not only reduced manual sorting but allows a more efficient use of floor space. Whatever the size and type of your business, a Lamson engineered system can save you material handling time and reduce your costs. **Mail this coupon today!**

LAMSON 75th YEAR

Plants in Syracuse and San Francisco
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Lamson Corporation
3830 Lamson Street, Syracuse 1, N. Y.
Please send me additional information on the new Lamson Sorting Conveyor System.
NAME.....TITLE.....
COMPANY.....
ADDRESS.....
CITY.....ZONE.....STATE.....

For more facts circle 612 on Reply Card

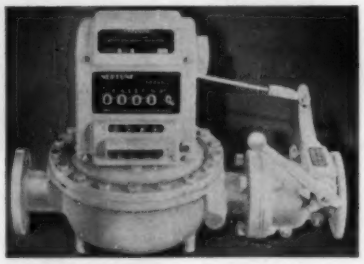
NEW PRODUCTS

(Begins on page 152)

lindrically ground on tool and cutter grinders or on any lathe with a tool post grinder. Half members are then locked in a displaced position to provide automatic radial relief. Made of high speed steel, the new Nobursink has a black oxide finish said to reduce friction and any tendency towards galling in applications where lubricants are not used. It is available with a 90-deg angle (produces a 45-deg chamfer). Nobur Mfg. Co.

53—STOP METERS handle the higher flow rates

Two new Auto-Stop Meters are available with double-trip automatic stop valves. Automatic deliveries of water, syrups, oils, solvents and other liquids to batching and blending processes are accomplished with accurate cut-off and



minimum hydraulic hammer even with high flow rates, says manufacturer; the quantity desired is set by pushing buttons and the meter shuts off the flow when the exact quantity is delivered.

The bronze meters are 1½ and 2 in. in size (10 to 100 gpm and 16 to 160 gpm flow rates). When applied to low viscosity liquids, such as water, the valve is furnished with a double-trip or cushioned-stop mechanism which acts to slow down the fast moving stream an instant before it shuts off the flow. Low loss of head is another feature announced for this automatic stop valve. The design affords straighter flow to eliminate turbulence, it is noted, and the valve is easily opened even against high line pressure. For viscous liquids at low rates of flow where there is no danger of hydraulic hammer, the automatic stop valve is offered with single-trip mechanism. Neptune Meter Co.

54—MULTIPLE OUTLET HEADER affords easier installation

Reported to effect 70 per cent saving in welding time required to complete bypass, blow-down and branch connections to pipeline gate settings, this fitting consists of a header with multiple seamless outlets in exact specified positions . . . plus a factory-fabricated conical reducer. The fitting is designed to eliminate nozzling in branch connections and saddle reinforcements.

According to manufacturer, the design and metallurgical integrity of these head-

DEHYDRATINE NO. 22

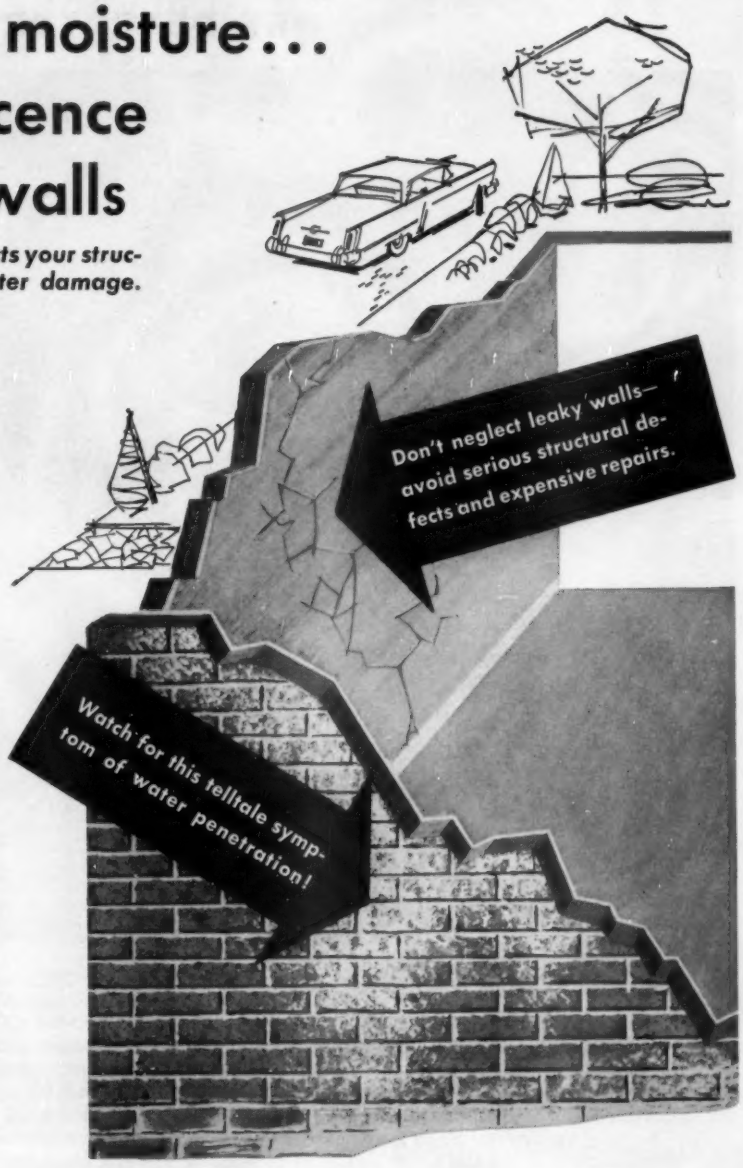
seals out moisture... stops efflorescence on masonry walls

Silicone base water repellent protects your structures from inside and outside water damage.

Dehydratine No. 22 is no ordinary "surface" repellent. It functions on the principle of "negative capillarity" *in depth.* The highly penetrating characteristics of Dehydratine No. 22 set up a valve-like action within the masonry that permits vapor to escape *outward,* but stops the capillary absorption of solid drops of moisture from passing inward.

Dehydratine No. 22 reduces soiling and discoloration

Dirt and soluble stains cannot enter the pores of masonry treated with Dehydratine No. 22. Thus foreign particles trapped on the surface are readily washed off by rain. Owners and operators of concrete or light-colored stone buildings find that this saves money by eliminating difficult and expensive cleaning operations. Since Dehydratine No. 22 is effective against "white bloom" or efflorescence, it preserves the original beauty of the exterior without changing the color or texture of the surface. It pays to protect your structures against *inside* and *outside* water damage with Dehydratine No. 22.


Don't neglect leaky walls— avoid serious structural defects and expensive repairs.
Watch for this telltale symptom of water penetration!

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Please send me more information on Dehydratine No. 22.

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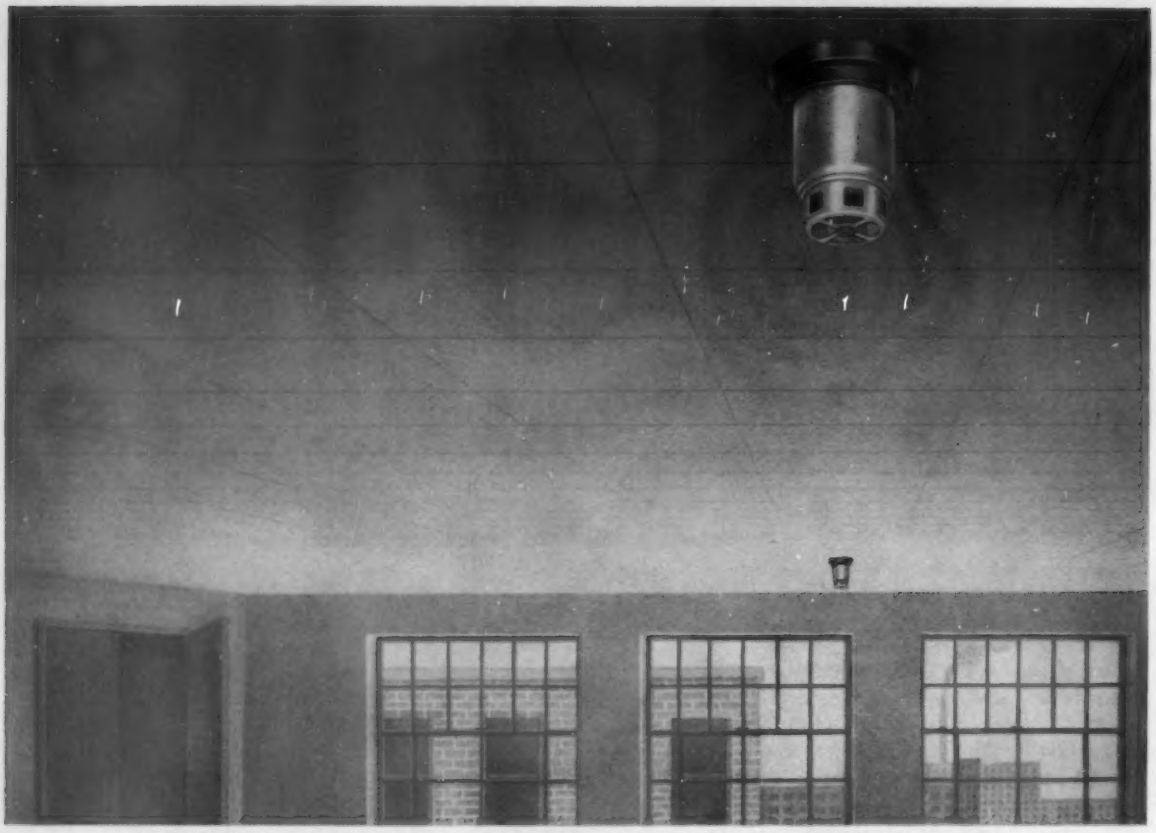
For more facts circle 613 on Reply Card

New, radio-active, automatic fire guard!

C-O-TWO PRE-DETECTOR SYSTEM



Each pre-detector head protects up to 3,600 square feet of area . . . harmless radio-active element utilizing ionization chamber principle quickly detects all forms of fire . . . requires only simple two-wire circuit and insignificant wall space for controls.

This completely new and positive means of spotting fire is just what you've always needed and wanted . . . detects in the earliest stage, invisible combustion gases, visible smoke, slow smoldering, as well as open flame. The C-O-TWO Pre-Detector System is simple to install, extremely economical to maintain and doesn't depend on thick smoke or heat for actuation.

As many pre-detector heads as necessary can be connected together in a single circuit and up to 16 separate circuits or spaces handled by one system. With a single circuit the pre-detector heads are connected directly to the fire indicating cabinet, while with multiple circuits the pre-detector heads are first connected to one or more space indicating cabinets capable of visually showing by number the exact location of the fire. Relays perform such functions as sounding alarms, closing fire doors, shutting down ventilation and releasing fire extinguishing systems.

The C-O-TWO Pre-Detector System has been subjected to extensive testing and carries Underwriters' Laboratories, Inc. listing, as well as Factory Mutual Laboratories approval. Proven pilot installations have been made in such diversified properties as a television station, an electric power company network analyzer room, a railroad signal tower, an airline flight training equipment room and the offices of an insurance company.

Don't take unnecessary chances any longer . . . the extensive fire protection experience of PYRENE—C-O-TWO over the years is at your disposal without obligation. Get complete facts about this new C-O-TWO Pre-Detector System today!

Pyrene

PYRENE — C-O-TWO

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C-O-TWO

COMPLETE FIRE PROTECTION

portable fire extinguishers . . . built-in fire detecting and fire extinguishing systems

CARBON DIOXIDE • DRY CHEMICAL • VAPORIZING LIQUID • SODA-ACID • WATER • CHEMICAL FOAM • AIR FOAM

For more facts circle 614 on Reply Card

NEW PRODUCTS

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to that of the piping to which it will be joined, but also additional resistance to stresses from thermal difference and external mechanical loads, plus maximum resistance to shock and vibration loads. Basic design of the headers parallels integral outlet of seamless welding tees. They can be produced in sizes through 42-in. pipe and larger, virtually without restriction as to length of header section, number, size or arrangement of outlets or range of conical reducer sizes. In addition to being used for valve settings on the main line, headers are suited as suction and discharge manifolds on compressors. Ladish Co.

More information on any of these products can be yours without cost or obligation. Just circle the item numbers on the Reader Service Cards provided on pages 235-236.

55—GAGE TESTERS for pressures up to 10,000 psi

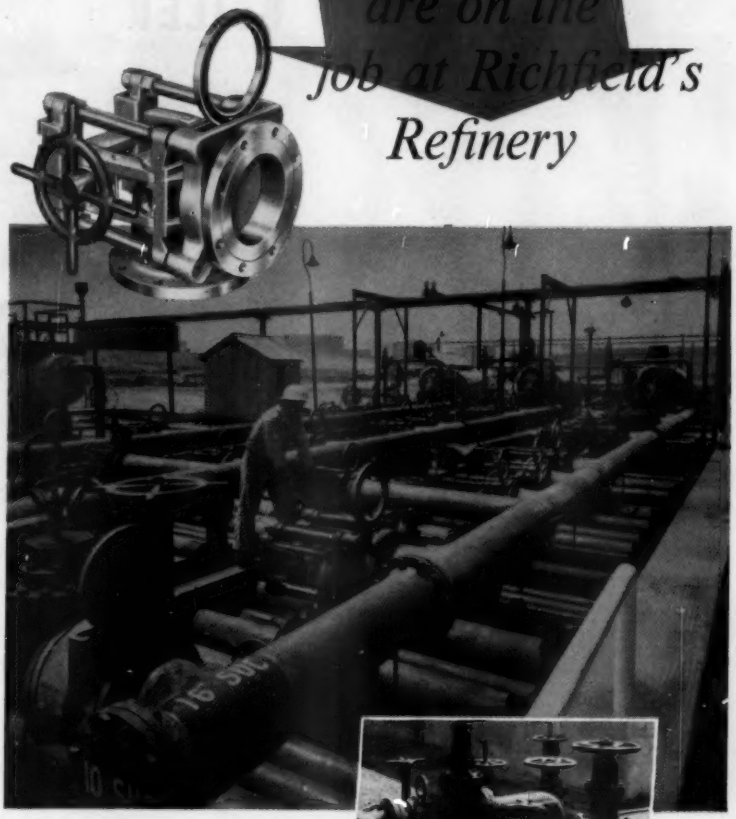
Described as sturdy in construction and modern and compact in design, these improved dead weight pressure gage testers are available in three models: up to 3000 psi; from 4000 to 6000 psi; and up to 10,000 psi. Manufacturer says they are simple to operate and accurate with 1/10 of 1 per cent of indicated reading. The complete unit with accessories is portable and contained in a metal case. A container for carrying the weights is also provided. The Amthor Testing Instrument Co.

56—CANNED ROTOR PUMP offered at lower cost

New methods of construction, new materials and a new cooling circuit are offered in the Model S series of seal-less centrifugal pumps. In addition, the ⅓-through 3-hp units cost from $100 to $150 less than their older but still available counterparts, Model C series. The S series Chempumps utilize fabricated parts in their construction which can be clad with such metals as titanium, zirconium and Hastelloy series metals, as well as Monel, Carpenter 20 and various types of stainless steels previously available. Corrosion resistant service on a much wider scale is possible, company notes, with these units. According to company, approximately 400 per cent more bearing area is offered by the bearings developed for the series. Made of Graphitar, bearings are semi-floating and can be replaced from front or rear of the pump without special tools and without breaking piping connections.

Cooling for stator windings, rotor and bearings, as well as bearing lubrication is provided by a cooling and fluid circulation system. Pumped fluid passes from

Impenetrable Sealing
HAMER BLINDS
are on the job at Richfield's Refinery



After testing their action in a trial installation, Richfield now uses Hamer Line Blinds extensively at its refinery at Watson as illustrated above.

HAMER *Visible Shut-off* LINE BLIND VALVES

HAMER *Plug Valves*

Thousands of users have proven the easy and immediate operation of Hamer Plug Valves. Will not stick or freeze.

Refinery operations require a valve that will provide a continual leakproof line shutoff. Hamer Blinds with their foolproof sealing action are unsurpassed for providing an absolute line seal that's both positive and permanent. In addition, Hamer Blinds fast, one minute, one man operation literally pay for their cost in downtime saving.

HAMER

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ACCESSIBILITY

is built into the
Continental
BOILER

. . . saves production time
. . . saves maintenance dollars

Rugged, simple in design, accessible—that's the Continental Automatic Boiler. Here are a few reasons why it's easy to keep this packaged steam generator at peak efficiency:

- Openings are provided to facilitate inspection of steam and water space.
- Both front and rear doors are hinged—affording quick access to furnace and return tubes.
- Cleaning, when necessary, is easy. One man can open both doors in a matter of minutes.

AND HERE'S WHY CONTINENTAL BOILERS STAY EFFICIENT FOR A LONG TIME:

- 2-pass design eliminates refractory baffles in front and rear which may burn out, leak and cause short circuit of gases.
- *All* return tubes are subjected to the same temperature and do equal work . . . and there is more uniform longitudinal expansion of the pressure vessel.

Used for high or low pressure steam and for hot water applications, Continental Boilers are fully automatic, range from 20 to 500 hp. and can be gas, oil or combination fired. Over 80% efficiency is guaranteed.

Send for Bulletins BE3-4 . . . and let us bid on the next boiler you need.

Continental AUTOMATIC BOILERS

BOILER ENGINEERING
and Supply Company, Inc.

2 Manavon Street
Phoenixville, Pa. Phone 5832

For more facts circle 616 on Reply Card

NEW PRODUCTS

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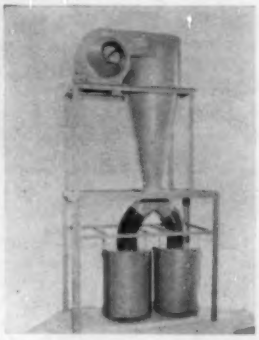
pump chamber, through front bearing, into rotor chamber and through rear bearing, returning to the eye of the impeller through hollow rotor shaft. Capacities range to 170 gpm and heads to 150 ft. Standard temperature and pressure limits are 350 F and 150 psi. Chempump Corp.

57—DUST COLLECTOR has greater storage capacity

The Model 30NW50 Dustkop Dust Collector is announced for use where greater dust storage capacity is necessary. It has an air handling capacity of 3600 cfm, with a static pressure of 6 in. of water, and is claimed capable of collecting dust from



practically any dust creating machine or operation, especially where the dust volume runs to rather high bulk. Collector eliminates emptying of a regular dust bin by shovel, with the addition of two rubber caster, roller dust cans that are connected to the collector by an all metal diversion Y. It is available as a recirculating air unit, or with attachments for outside exhaust where state codes, or the nature of the type of dust prohibits recirculation of the air within the plant. Clamp-on lids and Y connection are self-suspending for roller can removal and dumping. Aget Mfg. Co.

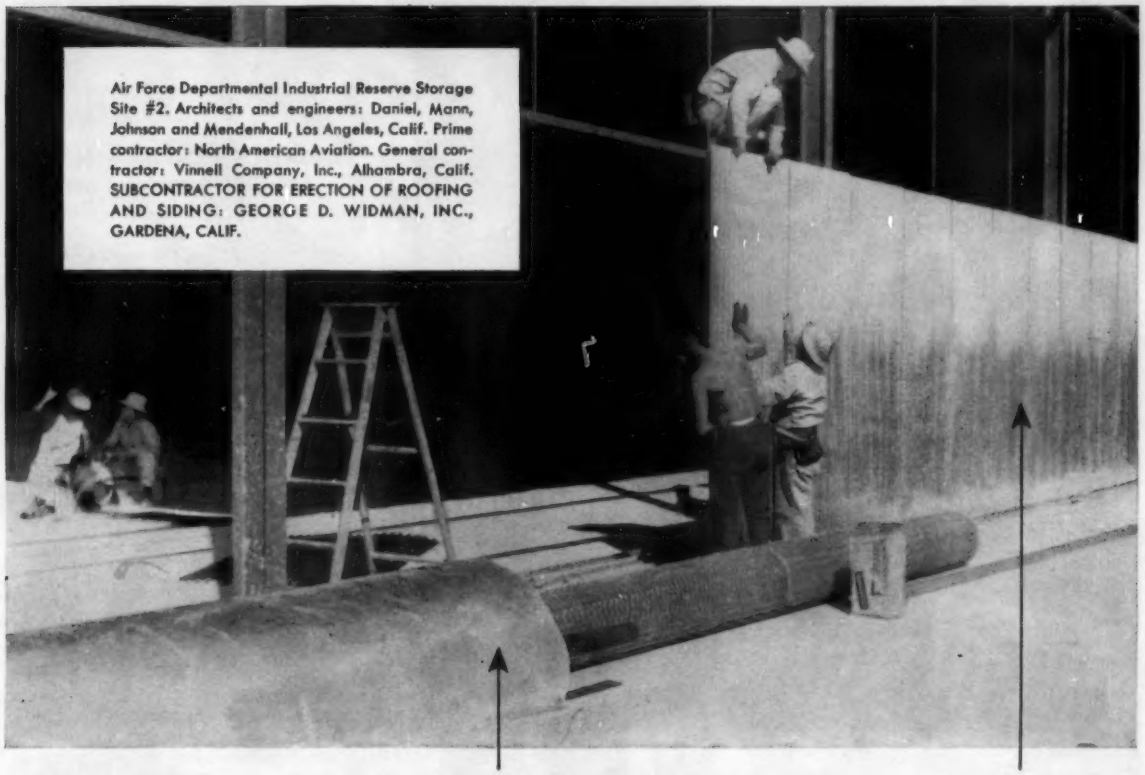
58—DEFLECTION INDICATOR for shafted machinery

Operating on a balanced bridge principle, this deflection indicator consists of two compact inductor coil pickup units which operate on a 60-cycle, 110-v power source and control assembly. It has no electronic tubes. When operating on a rotating machine, the two external series-connected pickup coils of matched impedance are mounted on opposite sides of the shaft with equal gaps between each coil and the shaft.

These coils form half the bridge circuit; the power source the other half. A lead from the midpoint of the coils is connected through a rectifier to the midpoint of the power source. So long as the air gaps remain constant, the bridge circuit is balanced and no current flows. If, however, a shaft deflection or vibration occurs beyond the limit pres-

WORLD'S LARGEST SINGLE-STORY WAREHOUSE BUILT OF ALCOA® ALUMINUM

Eleven-Acre West Coast Building Guaranteed for Ten Years Against Vapor or Water Leak



Air Force Departmental Industrial Reserve Storage Site #2. Architects and engineers: Daniel, Mann, Johnson and Mendenhall, Los Angeles, Calif. Prime contractor: North American Aviation. General contractor: Vinnell Company, Inc., Alhambra, Calif. SUBCONTRACTOR FOR ERECTION OF ROOFING AND SIDING: GEORGE D. WIDMAN, INC., GARDENA, CALIF.

The entire roof area of the warehouse is insulated with a Fiberglas blanket. One-half inch thick, the insulation was cemented to Alcoa 0.0025" aluminum foil and delivered in units to the building site. Blanket units were 4 ft wide and 250 ft long, the full length of roof slopes on each side of ridge line.

Alcoa 0.032" industrial roofing sheet, mill finish, in widths of 45.67", was applied both as roofing and siding for entire surface coverage of the building. This represented 6,515 squares. Most of the sheet applied to warehouse roof area was 14'10" in length, while the sheet applied in two rows for siding coverage was 14'10" long for upper rows, and 8'10" for lower rows.

Dwarfed by its Mojave Desert surroundings like a matchbox in a football field, the biggest building of its kind in the world, a sprawling, aluminum-skinned warehouse has just been completed at Palmdale, Calif.

500 ft wide by 1,000 ft long, with height from concrete floor to ridge line 33 ft, the $1,420,000 unit was completed in eight months with the lessee in full operation at the end of seven months. Thought to have the lowest cost per square foot of insulated wall and roof area of any insulated, humidity-controlled building, the cost of Alcoa Aluminum Corrugated Roofing and Siding, with insulation, was a remarkably low $.55 per square foot.

For complete information on rapid, practical construction with maintenance-free Alcoa Aluminum Industrial Building Materials, call your local Alcoa office. Or write for your copy of our AIA File No. 12-C. Address: Aluminum Company of America, 861-K Alcoa Building, Pittsburgh 19, Pa.

Your Guide to Aluminum Value

ALCOA ALUMINUM
INDUSTRIAL BUILDING MATERIALS
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For more facts circle 617 on Reply Card

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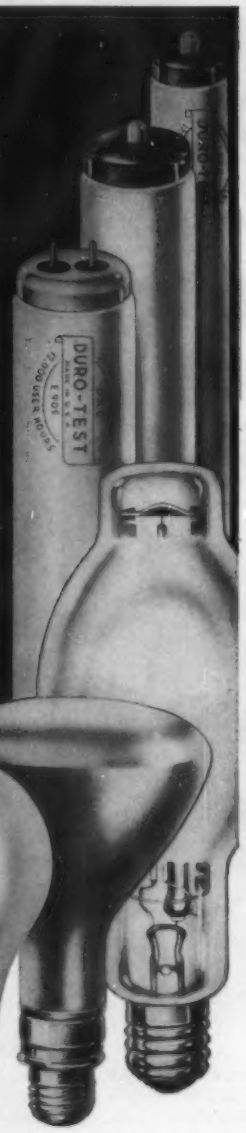
BUILT STRONGER TO BURN LONGER



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MERCURY VAPOR

Here's why:

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Operating at their rated watts and volts, they far outlast conventional lamps, yet maintain high lumen output throughout life.

Results? These stronger-built, longer-burning lamps reduce your overall lighting costs. Our representative in your area will show you how. WRITE NOW TO—

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WAREHOUSES IN PRINCIPAL CITIES FOR PROMPT SHIPMENT

For more facts circle 618 on Reply Card

NEW PRODUCTS

(Begins on page 152)

ent on the device, the variation of the air gap will unbalance the impedances, it is explained, and cause current to flow. A signal is sent to a magnetic amplifier and the operator is warned by a light on the control cabinet or by an annunciator. The control unit can be located where convenient. A time delay serves to prevent false warnings caused by vibration of short duration. Applications for the indicator include sewage and pipeline pumps, compressors, other machinery. Allis-Chalmers Mfg. Co.

59—BREATHERS, DRAINS for humid hazardous areas

The stainless steel universal breather and drain, the Type ECD (shown below at pencil point and in the top of the detached cover at right), allows passage of up to four times more volume of air than many types, according to manufacturer. The new devices are intended for

use on explosion-proof combination starters and circuit breakers, as shown, and other equipment housings in Class I, Groups C and D hazardous locations.

The breathers and drains have two functions: to drain off accumulated water, resulting from condensation, in the base of the explosion-proof housing; and to ventilate the housing by allowing constant recirculation of air, thus minimizing condensation. Larger air passages serve to prevent clogging due to dust and small dirt particles, it is noted. The units can be installed in explosion-proof housings by screwing them into hubs or holes tapped for conduit having five or more threads. This connection assures safety, company says, since at least five threads on the breathers and drains will be engaged. Crouse-Hinds Co.

60—PROCESS GAGES in cast case and blow-out back

Two new series of gages for the process industries are trade-named Supergauges and Solfrunts. The former are available in cast case construction, while Solfrunts have a solid front with safety blow-out back to protect workers. According to manufacturer, these gages offer longer life, accuracy and readability not obtainable in many smaller gages. The nylon-faced stainless steel segment with

FOUND by these manufacturers THAT

BLISS
E. W. Bliss Company
BOOTH #1414

BRYANT
Bryant Chucking Grinder Company — BOOTH #1015

CMC CLEARING USI
Clearing Machine Corp.
BOOTH #716

CLEVELAND
The Cleveland Automatic Machine Co. — BOOTH #412

CONSOLIDATED MACHINE TOOLS
Consolidated Machine Tool Co. — BOOTH #217

EDLUND
Edlund Machine Co.
BOOTH #115

famco
Famco Machine Company
BOOTH #507

FEDERAL PRESS
Federal Press Company
BOOTH #801

FOSDICK
The Fosdick Machine Tool Co.
BOOTH #1402

FOX
Fox Engineering Company
BOOTH #419

GALLMEYER & LIVINGSTON
Gallmeyer & Livingston Company — BOOTH #906

GREAVES
Greaves Machine Tool Co.
BOOTH #721

speeds installation of any machinery protects accuracy of precision machines

These machine tool builders cut set-up time at the Machine Tool Show from hours to minutes with BARRYMOUNT® Leveling Isolators. No drilling floors, no setting lag bolts, no shimming — they just set their machines on the Barry mounts, adjusted the leveling screws, and the normally tedious, costly job was done.

This is not just a show trick — it's a standard efficiency procedure for new installations and re-installations in large and small plants all over the country. And, *at the show or in your plant,* the isolation built into Barry mounts protects precision machines against vibration from nearby heavy equipment.

At the National Metal Exposition in Philadelphia, you will find Barry engineers at Booth 2062, ready to show you how you can simplify installation, protect machine accuracy, prolong machine life, and cut maintenance costs with Barry Machine Mounts.

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JOHNSON
Johnston Machine & Press Corp.— BOOTH #411

KINGSBURY
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MICRO MATIC
Micromatic Hone Corporation
BOOTH #1211

MOLINE
Moline Tool Company
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Monarch TURNING MACHINES
The Monarch Machine Tool Co.
BOOTH #920

THE MOTCH & MERRYWEATHER MACHINERY CO
The Motch & Merryweather Machinery Co.—BOOTH #606

Onsrud®
Onsrud Machine Works Inc.
BOOTH #812

RACINE
Racine Hydraulics & Machinery Inc.
BOOTH #102

SHEFFIELD
The Sheffield Corporation
BOOTH #1305

Van Norman
Van Norman Company
BOOTH #905

WIEDEMANN
Wiedemann Machine Co.
BOOTH #1420

For more facts circle 619 on Reply Card

NOW YOU CAN MAKE YOUR OWN NYLON REPAIR PARTS

fabricated from **POLYPENCO®/nylon shapes**

- Make one part or hundreds economically on standard metalworking tools
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- Get top performance in every part with quality-controlled Polypenco nylon shapes

Immediate delivery of POLYPENCO nylon rod, tubing, strip and slab. We'll help you fabricate.

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nylon and teflon*/other non-metallics/stock shapes

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*trademark for Du Pont tetrafluoroethylene resin

For more facts circle 620 on Reply Card

NEW PRODUCTS

(Begins on page 152)

stainless steel pinion is said to afford extended life under severe conditions.

Other features common to both lines include mono-unit construction for easy removal of entire gage assembly from case, and rapid adjustment without removal of dial. The gages come in 4½-, 6- and 8½-in. sizes in back flange, front flange and turret type cases. U. S. Gauge Div., American Machine and Metals, Inc.

61—MOBILE LIFT aids in overhead maintenance

Called the Bulb Snatcher because it reaches ceiling high for light bulb maintenance, this multi-purpose mobile, hydraulic lift is designed to raise man and materials up to 400 lb in weight to a

height of 20 ft above floor level. The unit can be raised or lowered from its rail guarded 24-in. diam platform or from the floor. A 35-ft Neoprene covered three-conductor cable conveys power for the 110-v electrical system. Company says the full height is reached within 45 sec for painting, plastering, repairing and changing light bulbs.

The unit consists of a rigid frame supported by three 12-in. wheels, the forward one being attached to a tow bar. The swiveling rear wheels have locks, and foot brakes are supplied to prevent movement when in use. When not elevated, the Bulb Snatcher is only 6 ft 5 in. high, 30 in. wide. Galloway Co.

62—MANUAL STARTERS are toggle switch operated

For manual across-the-line starting of small, single-phase a-c motors, these toggle-switch operated starters (Bulletin 6002 Type RL) are available in single- or double-pole types for a maximum of 220 v, 25 to 60 cycles. Bi-metallic thermal overload protection is provided with interchangeable heaters covering the entire range of the starters. The heaters can be interchanged from the front without removing the starter or wiring connections. Other features announced include adequate wiring space, trip-free silver-to-silver contacts and rugged con-

Duraface* FOAMGLAS

the cellular glass insulation and integral finish

This is a pharmaceutical tablet drying room recently completed by SCHERING CORPORATION at their Union, N.J., plant. They picked new Duraface FOAMGLAS to insulate and finish the walls in one operation. They say: "These remarkable cellular glass blocks give us dependable insulation plus an attractive and durable finish that we can wash down as often as necessary."

Tough, waterproof Duraface FOAMGLAS insulates and finishes these walls

One material, erected in one operation is both insulation *and* finish for the walls you see above. It's *Duraface* FOAMGLAS . . . the remarkable cellular glass insulation intra-fused with a hard white crust of denser sealed cells.

This unique new product gives you all the important benefits of long-lasting, high-performance cellular glass insulation PLUS an integral finish that:

- **can't peel or separate!**
- **is safely and easily washed because it's waterproof!**
- **is fireproof and vermin-proof!**
- **takes greater impacts than standard applied finishes!**

Find out today how you can solve *your* insulation and finish problems with one material . . . *Duraface* FOAMGLAS! Write us for a sample and descriptive folder.

Pittsburgh Corning Corporation

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*A trademark of Pittsburgh Corning Corporation

New Duraface FOAMGLAS is completely waterproof. You can scrub it or hose it down without impairing its high insulating efficiency.

For more facts circle 621 on Reply Card

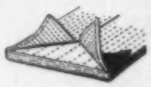
ENGINEERED BELTING...THE RIGHT BELT FOR EACH JOB

Do you need strong belting, too?

■ This remarkable Imperial Belt was installed in Chicago's Union Station as a mail bag conveyor in the summer of 1945. For nine years it has operated almost continuously—24 hours a day, seven days a week. The only exception is when power shut-offs or blockades occur. Such rare stoppages last only a few minutes. The belt that has turned in this tremendous service record is an Imperial Black Rexall, 36"x4-ply, 410 feet long. It is one of more than 20 Imperial Black Rexall conveyors in the Chicago Union Station—belts whose aggregate length is 6740 feet, or well over a mile.

Inner-locked construction—special impregnation

Imperial Black Rexall is chosen for jobs like these because of its great strength and toughness. Constructed of tightly-woven heavy-duty silver duck, it is double-stitched and inner-locked to prevent ply separation and is impregnated with a special compound that strengthens, lubricates and preserves the fibers. Black Rexall Belting is unexcelled for conveyors and elevators handling heavy or semi-abrasive materials.



Belting Job Designed for You

Whatever your belting need, there is a job-designed Imperial Belt to fill your requirements and cut your materials handling costs. Write for informative new Catalog 54-3.

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BELTING
First in stitched canvas belting for over 45 years

You expect more from Imperial and you get more!

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Chicago 23, Illinois

Write for new Catalog 54-3. It will help you cut belting costs.

For more facts circle 622 on Reply Card

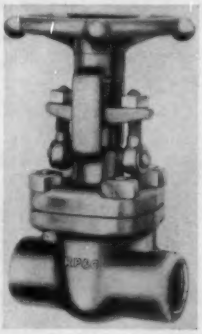
NEW PRODUCTS

(Begins on page 152)

struction. The starter comes in several enclosures: general purpose (NEMA Type I); weatherproof (NEMA Type IV); and explosion-proof (NEMA Type VII). It is available in open type or flush type with single gang flush plate. Clark Controller Co.

63—GATE VALVES with improved design features

Major improvements announced for company's line of forged steel gate valves for the petro-chemical, power, and process piping industries include stainless steel eyebolts, stainless steel nuts, a sturdier



gland, stainless steel follower, a redesigned stuffing box and smoother operating stem. The combination of a 500 BHN heat treated stainless steel wedge with stainless seat rings, hard chrome plated, is designed to resist seizing and galling, as well as abrasive wear. Stuffing box consists of molded asbestos, wire reinforced and mica lubricated — reducing the possibility of pitting of stainless steel stem. Valves come in sizes from ¼ to 2 in., with either screwed or welded ends. R-P & C Valve Div., American Chain & Cable Co.

64—GLASS BLOCK, heat reducing, in 8-in. size

Suntrol Glass Block, previously introduced in a 12-inch size, is now available in an 8-in. model. This glass block incorporates a pale green fibrous glass diffusing screen that reduces intensity of glare, heat. Pittsburgh Corning Corp.

65—PUMP for pneumatic process control systems

This controlled volume pump with instrument air stroke length adjustment uses 3 to 15 psi instrument air signal to adjust capacity. It is designed to solve specific low capacity flow control problems, and utilizes an air servo system with feedback loop to give capacity adjustment with an accuracy claimed within 1 per cent.

Stroke length of the pump is infinitely adjustable from zero to 100 per cent of full length by a reversible rotary air

WHO makes the RLM units I need?

With the recent revisions in RLM Standards for Industrial Lighting Units, featuring new upward-component fluorescent units, it is more important than ever that you know *who* makes units which conform to these newly-established and recently-revised specifications. This chart gives you the up-to-the-minute answer. It is based on the latest report of the Electrical Testing Laboratories who continually check conformance to RLM Standards. For a complete set of RLM incandescent and fluorescent specifications, as well as the addresses of RLM Manufacturers, send for a complimentary copy of the 1955 RLM Specifications Book.

RLM Standards Institute. Suite 831, 326 W. Madison Street, Chicago 6, Illinois.

HERE is your up-to-the-minute ANSWER!

These are the MANUFACTURERS who offer RLM-LABELED UNITS

INCANDESCENT RLM SPECIFICATIONS							FLUORESCENT RLM SPECIFICATIONS											
#1	#2	#3	#4	#19	#40		TD-1		TD-2		TD-3	D-1		D-2		D-3	SD-1	
100-1000w Dome	100-1000w Deep Bowl	100-1000w Sym. Angle	500 & 1000w High Bay	200-1000w Glassteel Diffuser	500 & 1000w High Bay *		2-40w & 2-38w	2-75w	3-40w	3-75w	2-90w & 2-40w	2-40w & 2-38w	2-75w	3-50w	3-75w	2-90w & 2-40w	2-40w	2-75w
						ABOLITE REFLECTOR DIV.												
4	5	2			2	APPLETON ELECTRIC CO.												
5	4	4			3	BENJAMIN ELECTRIC MFG. CO.	OC	OC	OC	OC	OC	OC	OC	OC	OC		C	C
						DAY-BRITE LIGHTING, INC.						O	O	O	O	O	O	O
						EASTERN FIXTURE CO., INC.	O	O	O		O							
2	4	2				ELECTRO SILV-A-KING CORP.	OC	O	OC	O	OC						O	O
						ENDER-MONARCH CORP.	O		O									C
						FLUORESCENT FIXTURES OF CALIF.	OC	O	OC	O		O	O	O	O		C	OC
						GLOBE LIGHTING PRODUCTS, INC.	OC	O	OC	O		OC	OC	OC	OC		O	O
						THE EDWIN F. GUTH CO.	O	O	O	O	O							
						KEYSTONE ELECTRIC MFG. CO.	OC	O	OC	O		O						
						LEADLIGHT FIXTURE CO.	OC	O	OC	O		O	O	O	O			
5			2	2		THE MILLER CO.	OC	O	OC	O	OC	O	O		O			
						MITCHELL MFG. CO.	O		O		O							
4			2	2	2	MULTI ELECTRIC MFG., INC.												
5	4	4				OVERBAGH & AYRES MFG. CO.												
5	4	4	2	2		QUADRANGLE MFG. CO.												
						THE RUBY LIGHTING CORP.	O	O	O	O								
						RUBY-PHILITE CORP.	OC	O	OC	O	O							
						SMITHCRAFT LIGHTING DIV.	OC	O	OC		O	O	O	O	O			
5	4	5		3		SMOOT-HOLMAN CO.	OC	O	OC	O	O	O	O	O	O		O	O
4		1				SPERO ELECTRIC CORP.												
						SUNBEAM LIGHTING CO.	O	O	O	O								
						SYLVANIA ELECTRIC PRODUCTS, INC.	OC	O	OC	O	OC	OC	O	OC	O	OC	O	O
4	2	4		1		WESTINGHOUSE ELECTRIC CORP.	OC	O	OC		O					O	O	
5	4	2				WHEELER REFLECTOR CO.	OC	O	OC	O	OC	OC	O	OC	O	OC	C	C
						WORK-O-LITE CO.	O	O	O	O	O							
						ZANE MFG. CO.	O	O	O	O								

* Aluminum Reflectors all others are Porcelain Enamel

TD-1, 2, 3 – without uplight

D-1, 2, 3 – 5–15% uplight

SD-1 – 20-30% uplight

O = Open End

C = Closed End

Note: Many manufacturers make incandescent RLM Units for more than one lamp size. The numerals refer to the number of different-size RLM Units which the manufacturer offers under the specification.

LOOK FOR MANUFACTURERS NAME AND RLM ... IN COMPLIANCE WITH SPECIFICATIONS AND ... ELECTRICAL TESTING LABORATORIES, INC

RLM STANDARDS INSTITUTE INCORPORATED

The letters RLM stand for Reflector and Lighting Equipment Manufacturers

For more facts circle 623 on Reply Card

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—SIZES UP TO 24"

—PRESSURE CLASSES FROM 150 TO 2500 LBS.

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• Included are gates, globes and angles, swing and lift checks, in a wide range of constructions, and all classes of flanged fittings. Pressure sealed designs for high temperatures and pressures, automatic stop and check valves, and many other special purpose valves and fittings complete the line.

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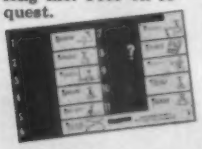
"How to Protect Your Valves"
17" x 11" wall chart gives installation and operation pointers to protect valves, prolong life. Free on request.



• All R-P&C steel valves and fittings conform to the exacting standards of design and manufacture that users have learned to expect from R-P&C. And all are providing, in many different applications, the dependability that is the R-P&C standard.

See your R-P&C distributor or write for R-P&C's convenient catalog

ACCO

R-P&C Valve Division
AMERICAN CHAIN & CABLE

TRADE MARK

Reading, Pa., Atlanta, Boston, Chicago, Denver, Detroit, Houston, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

R-P&C valves

For more facts circle 624 on Reply Card

NEW PRODUCTS

(Begins on page 152)

motor. This motor and other components of the pneumatic servo system are housed in a 22-in. high cabinet on the pump base. Four gages show key air pressures and actual stroke length is indicated by a dial on the pump. According to company, sensitivity of the flow control instrument is sensitivity of the flow control instrument is such that 1/70 psi change in instrument control air pressure causes re-setting of pump stroke length. Milton Roy Co.

66—CONTACT BURNISHER for relays, solenoids, brushes

The handy, pocket-sized Contact Burnisher No. 160 can be kept available for ready use. Fitted in a pen-type case, the burnishing element, a micro-fine surface,

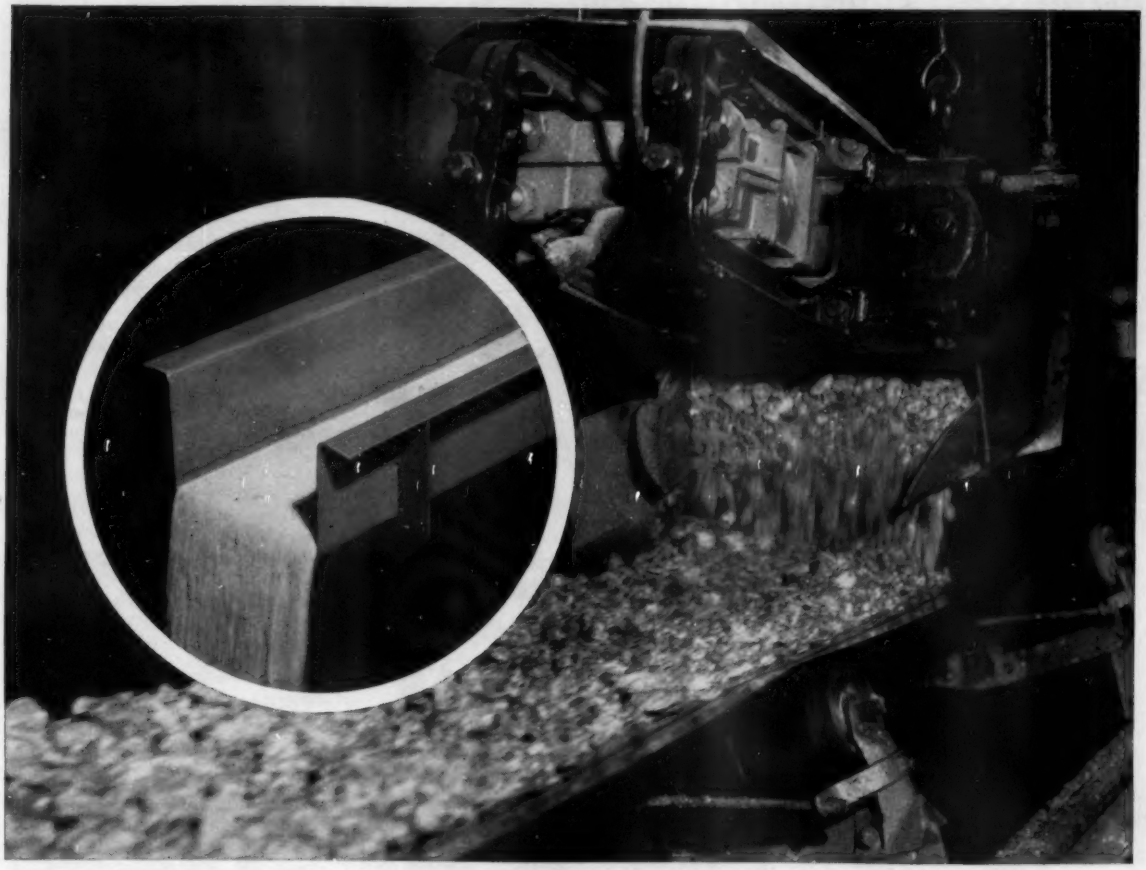
gives mild abrasive action. The abrasive, while it removes dust, grit and carbon build-up, removes only a minimum of contact metal, says manufacturer. Tests are reported to show that frequency of contact maintenance can be decreased because of the polishing action of this burnisher—it leaves no oil film, grit, dirt or contact filings. The element is protected by its case, and being of insulating plastic, this case is also said to premit burnisher's use on energized contacts. Adre Co.

67—DUST COLLECTOR for the smaller installations

Dust-Pak is a portable package dust collecting system for use in small installations or on isolated machines in large plants. It is available with casters where flexibility is desired. Dust-Pak extracts dust and other particles from the air by a combination centrifugal separation and filtration. It has a replaceable standard "throw-away" type filter. Manufacturer points out that the centrifugal action minimizes the dust load transmitted to the filter, adding to its service life. Heavier particles are separated from the air and deposited in a drawer at the base of the unit for disposal. Dust-Pak is available in sizes from 400 to 1000 cfm. Schmieg Industries, Inc.

68—SCREW DRIVER, electric, for production work

Designed for accurate and speedy work on production lines, this electric screw driver is also said to offer greater safety. It operates with one-hand control, leaving the other hand free to hold or guide material being processed. It has a heavy steel suspension bail that can be mounted on company's overhead balancer, and there's an instant start-stop control.



Jeffrey puts VIBRATION to useful work

You can solve many problems of conveying solid materials with Jeffrey Electric Vibrating Feeders. Move fine powders or huge stone blocks . . . a few ounces or two thousand tons per hour . . . dripping wet or bone dry . . . at temperatures ranging from 30° below zero to 2,000° above. Materials are propelled in a smooth, continuous stream by each forward vibration stroke.

Balanced vibration in the Jeffrey system matches electrical frequency to natural mechanical frequency of the driven equipment. This makes the system highly economical to operate, since all available energy does useful work. It is easy to control, safe, quiet and dependable. Vibration is scientifically isolated within the conveyor.

Jeffrey's years of experience with conveying problems enable us to furnish systems exactly right for each particular task. Catalog 870 describes the complete line of Jeffrey Vibrating Equipment. For a copy, and for help on your conveying problems, write The Jeffrey Manufacturing Co., Columbus 16, Ohio.

JEFFREY

CONVEYING • PROCESSING • MINING EQUIPMENT • TRANSMISSION MACHINERY • CONTRACT MANUFACTURING

For more facts circle 625 on Reply Card

Even a few grains of dust, dirt, or grit can "jimmy up the works" in your plant . . . can be costly to you

PUT A

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BLOWER-SUCTION CLEANER

TO WORK It will protect your motors, machinery and equipment . . . reduce dust hazards. . .

IT WILL SAVE YOU MONEY

MADE IN 5 MODELS

Available with cleaning attachments and optional equipment for scores of applications.

2-Speed Model HP illustrated

Special set of attachments illustrated; standard set and optional equipment not shown.

Quickly and easily, this powerful cleaning tool eliminates grit and grindings from your machinery, gets rid of damaging hidden particles that lodge in hard-to-get-at places. For full description, write:

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6619 S. Narragansett Ave., Chicago 38, Ill.

Ask for folder B901

SEE YOUR MILL SUPPLY DEALER FOR A DEMONSTRATION

For nearly half a century, manufacturers of vacuum cleaners for the home, blower-suction cleaning equipment for business and industry, and universal fractional horsepower motors for all uses.

For more facts circle 626 on Reply Card

NEW PRODUCTS

(Begins on page 132)

The tool is powered by a universal-type motor, with rating of 2.2 amp at 115 v, and 1.1 amp at 230 v. It is intended for use on up to No. 10 machine screws, self-tapping, ¼-in. machine screws. Reversing is provided by turning a knurled ring 45 deg. Mall Tool Co.

69—CODING MACHINE imprints the small boxes

For automatically imprinting small boxes and similarly shaped products, this marking unit is designed to transfer boxes from the production line conveyor, preposition them, and carry them through the machine for spot printing. Each box is taken to the printing device, imprinted with the code and then discharged back to the original conveyor. Boxes are imprinted at the rate of 180 per minute, company states. The printer uses a vertical aniline type marking system with an open reservoir and continuous feed mechanism. A pump arrangement eliminates need for pipes, tubes or valves, it is explained, and the inking mechanism can be cleaned in minutes. Industrial Marking Equipment Co., Inc.

To receive product data circle item numbers on the handy Reader Service Cards provided on pages 235-236.

70—CONTROL SYSTEM permits long working distance

Set P4L is announced as a ready-to-use photo-electric control system offering increased operating distances plus high speed operation. It is designed to operate over distances up to 100 ft and afford speeds up to 600 operations per minute. Major applications include materials handling control over long distances, use with mirrors to provide "curtain of light" protection of large work spaces, operation of wide doors, and invisible beam systems for intrusion alarms. Long-range protection is provided for personnel working on presses, textile looms, paper and printing machines.

The set has a remote phototube with an extended lens system. High-sensitivity is said to assure positive action under varying light conditions and interference caused by vapor, dust. Relay is actuated on completion of beam. Photoswitch Div., Electronics Corp. of America.

71—PLASTIC STEEL is versatile material, easily handled

Devcon consists of 80 per cent steel and 20 per cent plastic. It is used in making tools, drill jigs, fixtures for holding parts during machining, buffing and assembly, chuck jaws, and is reported to offer worthwhile savings in both time and

HALL LABORATORIES, INC.—A SUBSIDIARY OF HAGAN CORPORATION, PITTSBURGH, PENNSYLVANIA

Hall Industrial Water Report

VOLUME 3 OCTOBER 1955 NUMBER 5

It Takes a Lot of Water Conditioning To Manufacture Paper

Ten billion tons of water are required annually for many uses in the papermaking industry. Production has increased from less than one ton per day in the first mill in the United States to 26,656,000 tons in 1954. Water-connected problems of all kinds are handled in over two hundred papermaking plants by Hall service engineers.

Pollution Abatement Program Cited by State Authorities

In connection with its waste disposal problem, an eastern paper manufacturer with the advice of Hall Laboratories set up an investigative and remedial program supervised by Hall staff engineer Herman A. Reda.

The plant had been discharging its industrial waste waters into a waterway supplying a city of 130,000. Pollution was so severe that septic conditions developed when there were periods of low flow. The fact that potable supplies were affected made the situation quite serious.

The removal of contamination, required by the state, was accomplished by utilizing air flotation units to clarify the water and remove the pulp fiber. This equipment functioned so efficiently that both the water and the fibers of pulp could be re-used. The selection of this equipment was based on pilot plant studies which indicated a 97.1 percent removal of suspended solids and a 95 percent reduction in oxygen consuming material.

$100,000 per year is the plant's estimate of the value of the reusable pulp recovered by the in-plant changes and treatment processes recommended by Mr. Reda. Sufficient clarification of white water to permit re-use on the paper machines reduced the plant over-all water consumption.

The reduction of wastes at their sources was, of course, one of the most important results of this work. In their report to the General Assembly of Delaware, the Commission stated that the cooperation received from industry in this particular study, investigation, and follow-up was most satisfactory and exemplary.

Maintenance Cost Reduced

A Canadian newsprint plant was running efficiency tests throughout the plant. At the suggestion of Hall engineer J. C. Skerrett, the plant carried out a three-month test on a paper machine to determine the effect of Hagafilm® in improving heat transfer by cleaning out old corrosion products and controlling return line corrosion.

Pleased with the results of this test, the plant decided to run a test on their Flakt dryer, a separate unit, where leakage due to corrosion was a problem. Overtime for weekly welding of the interconnecting piping of the steam and condensate headers was a costly item.

Leaks stopped within one week after a Hagafilm feed of 2ppm was started, and since there has been no recurrence after six more weeks of operation, it is obvious that maintenance has been reduced to almost the vanishing point.

Hall Engineer Reports on Service

Putting a new boiler into operation can bring up some unexpected problems as the following reports from a Hall engineer on another paper plant show.

Discussed recommendations outlined in my letter to the plant. Lined up plant for boiling out new boiler. Also discussed variations in raw water characteristics.

Returned to plant for initial operation of hydrogen zeolite unit. Suggested that plant start to decrease rate of blowdown as more of the blended water is used. Boiler-water test results showed deficiencies of phosphate and sulfite. Had them increase feed of chemicals.

Went over operation of sodium-hydrogen zeolite unit setup. Found that system was cut into service only twice a day as the clear well level did not drop appreciably. Checked clear well water to determine whether or not raw water was getting into the system and found it O.K.

Learned that the plant had been operating for four days with an acid boiler water. Investigation indicated the cause to be faulty operation of the flow control valve. Immediately cut off the hydrogen zeolite unit and went to straight sodium zeolite make-up.

Called to check on plant since we eliminated the acid in the boiler water. Boiler-water alkalinities now around 16 ml and plant is again blending the sodium-hydrogen zeolite water.

A while ago I alerted the plant to the fact that something was wrong in the setup because of unexplainable high alkalinity and high phosphate consumption. My checks on the clear well and condensate revealed nothing. However, about ten days ago, things became very upset and clear-well water indicated contamination. Investigated and found that main sewer line carrying backwash water from raw-water filters was broken and that there were cracks in the clear well. The sewer runs alongside the clear well. Contamination occurred whenever level in the clear well was low, allowing water to seep in.

Director of Hall Laboratories Receives A. S. T. M. Award

Dr. Everett P. Partridge has received the 1955 Max Hecht award of the American Society for Testing Materials for "30 years of outstanding contributions to the technology of industrial water."

Industrial Water Problems Require Special Handling

There are no "stock answers" to industrial water problems. For information write, wire or call Hall Laboratories, Inc., Hagan Building, Pittsburgh 30, Pa.

Water is your industry's most important raw material. Use it wisely.

Hall Laboratories, Inc.—Consultants on Procurement, Treatment, Use and Disposal of Industrial Water

For more facts circle 627 on Reply Card

"You Get Extra Battery Performance –

America's Finest!
GOULD
Industrial Truck Batteries

THANKS TO GOULD FIELD ENGINEERING SERVICE!"

It's a proven fact that regular, systematic battery care can add months, perhaps years, to the life of a battery! Gould's nation-wide Field Engineering Service enables *you* to get the benefit of this added service . . . and lower your over-all battery power costs.

Your Gould Field Engineer's one job is to see that you get maximum service from your batteries. He is factory-trained to instruct your own men as to correct maintenance routines and to help set up a simple record system for anticipating battery needs.

There's a Gould Field Engineer in your area. He's as near to you as your telephone. Call him. And when you see him, ask him for the new Gould Plus-Performance Plan material for your battery maintenance staff.

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GOULD-NATIONAL BATTERIES, INC.
TRENTON 7, N. J.

"BETTER BATTERIES THROUGH RESEARCH"

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For more facts circle 628 on Reply Card

NEW PRODUCTS

(Begins on page 152)

money. According to company, this material is as easy to handle as modeling clay. Two hours after the addition of a hardening agent, the mixture of steel and plastic becomes a tough, rigid, steel-like mass, it is stated—without heat or pres-

sure. Once hard, it can be sawed, threaded, drilled or ground on regular metal-working equipment. Two types are available. Devcon A is a putty and can be applied to a vertical surface. It won't run or sag, says manufacturer, and requires no glass fabric or tailoring. Devcon B is a viscous liquid that can be poured. There is claimed to be practically no shrinkage during hardening. Chemical Development Corp.

72—ROTARY SWITCHES are eight-position units

Choice of detent action or snap action in a multiple, rotary selector switch is afforded in the ESCO JD-JS line. Designed for tap, transfer, or selector applications, these switches are rated at 30 amp, 230 v a-c, and can be had with up to five poles. In the JD type, with positive detent action, rotor movement can be limited to any number of positions up to eight, it is noted, with or without an "off" position; or the switch can have unlimited rotor movement in both directions.

In the JS type, a coiled-spring mechanism provides snap-action make and break. This switch is available with unlimited rotation in both directions, utilizing the full eight positions; or can have its action limited to two, three, four, or five positions. Switches have knife-blade contacts enclosed in molded phenolic discs. Screw terminals are provided for feeder and load contacts. Units mount back of panel by four screws. The required panel area, including clearance, is contained within a 4-in. circle. Bulletin 5 gives data. Electro Switch Corp.

73—REFRACTORY features sandwich construction

Introduced for use in the ceramics and abrasives industries to prevent staining of kiln fired products, this "double-face" refractory is a type of sandwich batt or slab. It has a silicon carbide refractory

For more facts circle 629 on Reply Card——→

Long Beach Calif. High School; Hugh R. Davies, Architect; Smith-Campbell Co., Contractor.

Robertson Offers Free Daylight Engineering!

As one of the world's leading manufacturers of maintenance-free skylights and sash, H. H. Robertson Company is prepared to offer you professional Daylight Engineering Service without obligation. Here's how it works. Upon request, Robertson engineers will look over your drawings and obtain from you a description of the work performed within your building. Robertson engineers will then establish a foot-candle light intensity curve for a skylight and sash design that will be the best combination of economy, practicality and efficiency. A report will be made available to you, including details and specifications to cover recommendations. You can then proceed with the daylighting project or not, as you see fit.

Write now for your free copy of Robertson's new comparative cost study which shows you how to pay for your skylights within a few years from artificial light savings. Use the coupon below.

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Please send me free copy of Daylighting Cost Study booklet.

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COMPANY _____

ADDRESS _____ CITY _____

IT'S FLATTERING TO BE IMITATED

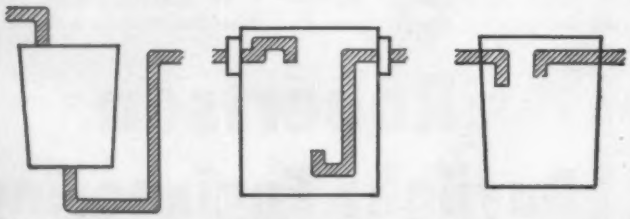
● Old Davy would be mighty flattered if he were here to see his imitators. We, too, at Anderson are flattered that so many trap manufacturers have imitated Super-Silvertop's straight-through piping. Such action acknowledges Super-Silvertop's leadership.

Years ago we discovered if properly designed a steam trap could be installed as an elbow or straight-in-line saving 9 pipe fittings and a half-hour's labor. Although many other traps are now using the straight-through design, there is still a basic important difference. They only offer the straight-through design and not optional design of either straight-through or elbow inlet connection. Also their design is available in only a few sizes and is obtained by means of building piping into the trap, instead of a truly engineered design. Built-in piping results in narrow, thin-walled, hard to clean, cored passages that can cause gaskets to blow.

The next time you buy or specify, select Super-Silvertops with straight-through and elbow installation . . . in all sizes.

THE V. D. ANDERSON CO.
1939 West 96th Street
Cleveland 2, Ohio

Only SUPER-SILVERTOPS offer Simplified Piping Without the Use of Narrow Thin-Walled Passages



This conventional design requires 9 fittings and complicated piping.

This design eliminates the fittings but results in narrow cored passages.

Only Super-Silvertop eliminates narrow-cored, thin-walled, passages.

SUPER-SILVERTOP Steam Traps

Quality Steam Traps Since 1886

For more facts circle 630 on Reply Card

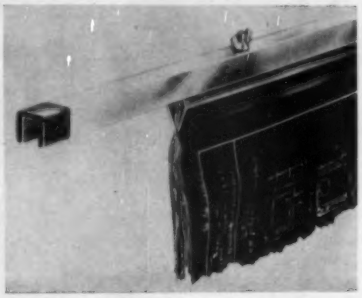
NEW PRODUCTS

(Begins on page 152)

in the center, and one outer layer of zircon, and one of mullite. To date it has been used for firing grinding wheels. When a white aluminum oxide wheel is fired, it is placed on the mullite face. The zircon face is used to fire a red aluminum oxide wheel. Electro Refractories & Abrasives Corp.

74—SNAP DEVICE holds engineering plans

Plan Hold has been designed to fit any plan rack or file and will hold 1 or 150 prints without necessity of punching or drilling holes or mutilating plans in any way. Prints may be added or removed



quickly and easily without disturbing other prints. Simply loosen wing nuts and Plan Hold snaps open. Tighten nuts and prints will not slip. Wing nuts and studs are on end of the holder, never in contact with plans or prints. Plans always lie flat, it is pointed out, can't be torn or perforated by protruding nuts or bolts. The Plan Hold is made of satin-finished aluminum and all corners and edges are rounded, making it light and easy to handle. Plastic tips protect against scratching or marring of desks. Plan Hold Div., Air Comfort Co.

75—CAM VALVE has larger roller and plunger

For increased bearing surface and longer life, this new heavy duty cam valve has a larger cam roller and cam plunger. According to manufacturer, the plunger spring is loaded to take care of over-travel on stroke and working parts are sealed by a synthetic boot and otherwise sealed against contaminants. The cam roller is described as a completely sealed precision ball bearing. Although designed especially for foundries, it is suggested for any applications where sand, dirt or dust are present. It is available in the Model 2051, a four-way valve, and the Model 2054, a three-way type, both ⅜ in. Mechanical Air Controls, Inc.

76—CLEANING SOLVENT features low toxicity

C-I-Sol is claimed to have cleaning properties resembling those of carbon tetrachloride and to be 20 times less toxic. It is also non-flammable, says manufac-

85,000 Sling Users Liked the First Edition . . . NOW

FREE!

New expanded edition of our Famous **Tuffy Sling** *Handbook . . . Mail coupon for copy today!*

Tuffy's really tough. Bend it, loop it, jerk it. Tuffy's 9-part machine braided construction resists kinking. But if you are able to kink it by hand, see how easy it is to straighten out without damage.

Tuffy's pressed-on and swaged end ferrule eliminates rough edges that snag or catch. Smoothed edges protect hands, speed loading. Tucked-in splice is covered by new pressed-on ferrule—has 100 per cent of rated strength of the sling itself!

If you're a plant engineer, safety engineer, purchasing agent—if you use or buy slings—you need this new, enlarged edition of the most popular sling handbook ever published!

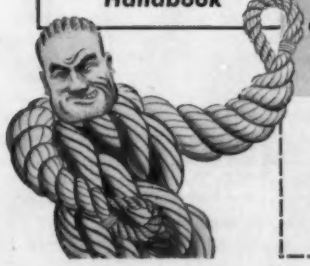
New types of factory fitted slings have been added to the Tuffy line. Now, old and new types are all made with a heavy walled steel ferrule. Ends of the ferrule are swaged flush with the machine braided strands leaving no projections to snag on loads. Many of the fittings—clamps, hooks, bridles, thimbles, saddles—are new, too. And this latest edition of the Tuffy Sling Handbook contains a host of other information you want and need for your job: a complete rigger's manual, authorized ratings and specifications for all Tuffy Slings; a new engineer's notebook; data tables on nearly a dozen versatile, easy-to-apply sling fittings.

But don't delay to order your FREE copy. Mail the coupon to us now. We'll send yours to you immediately.

CONSULT YOUR DISTRIBUTOR

when you want to buy Tuffy Slings or Tuffy Hoist lines to team up with your Tuffy Slings. Give him your requirements. He'll stock an inventory for you to draw against.

Mail Coupon For Your Free Copy of the Tuffy Sling Handbook



union Wire Rope **corporation**

Specialists in high carbon wire, wire rope, braided wire fabric, stress relieved wire and strand.

2272 Manchester Avenue, Kansas City 26, Missouri

MY NAME_____ TITLE_____

COMPANY NAME_____

ADDRESS_____

CITY_____ ZONE____ STATE_____

11

For more facts circle 631 on Reply Card

New Handling System

increases production while eliminating two lines

In one of the automotive industry's newest plants, production of frames for 1955 models was lagging, even though 6 lines were being used. Then Planet engineers were consulted.

They designed and installed a new frame handling system which exceeds current production requirements, doubling the output of the old-style line. *Now only 4 lines are used.* In addition, quality has been improved.

Here's how the system operates. The component parts of the frame are delivered by trolley conveyor to a frame assembly conveyor where they are automatically positioned for tack welding. The assembled frame is then discharged on to the frame welding conveyor illustrated above.

Here the frames are automatically rotated, 90° at a time so that all finished welding is done on a horizontal plane as the frames move by each welding station. Frames are then automatically conveyed through checking, cleaning, and painting operations.

If you have a production problem, why not consult Planet Corporation engineers? Write or phone today. There is no obligation.

PLANET CORPORATION

1840 SUNSET AVENUE
LANSING, MICHIGAN

- CONVEYORS
- ENGINEERED SYSTEMS
- FOUNDRY EQUIPMENT
- AUTOMATION
- STEEL FABRICATION

"IT PAYS TO PLAN WITH PLANET"

NEW PRODUCTS

(Begins on page 152)

turer, and presents no fire hazard when used near an open flame or next to grinding operations. C-I-Sol is suggested for removing grease, wax, oil and tars from metal products, hand tools, machine tools, sheet metal and tubing. Although not suitable for vapor degreasing, it is adaptable to cold cleaning, dip cleaning and bucket cleaning, company states. Chem Industrial Co.

77—RUBBER DOCK BUMPER absorbs shock

Herco-Flex Rubber Dock Bumpers can be mounted on new or existing docks to create a shock absorbing buffer against truck impact and to protect building and cargo. The units have facings of rugged, abrasive resistant rubber, mounted edge-

wise in welded steel frames. The end brackets of these frames are designed so that they present a full bumper surface. Installation is easy and cost-free, company states, for they simply bolt at each end to face plate of wood, steel, or concrete dock. Several models are available in dimensions from 12 to 48 in. According to company, long life is assured because bumpers won't splinter or scrub off, rubber facing provides enough spring reflex to compensate for the up and down motion of the truck. They can push back and snub the impact of trailers weighing tons, it is said, and they minimize damage as well as speed loading. The small size sells for about $13 and the large for about $25. Karl A. Herman Co.

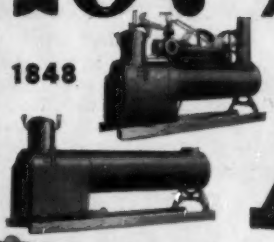
78—BATCH COUNTERS, direct reading instruments

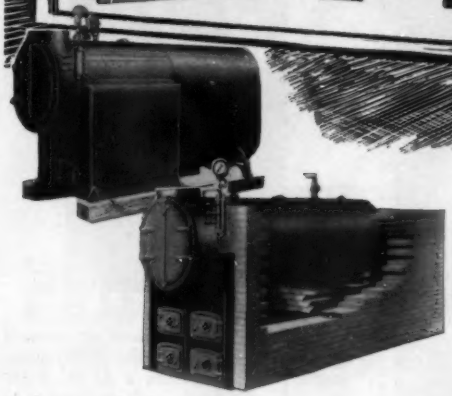
Direct reading totalizing electronic counters in the Detectron DS-700 Series are designed for such applications as batch counting, measuring characteristics of turbines and electric motors, counting total revolutions of high speed shafts, etc. When used with an accessory transducer, they count at speed far in excess of mechanical units, it is stated.

Available in four models, these lightweight, portable counters operate accurately from 0 to 100,000 counts per second, depending on number of decades, manufacturer explains, and a mechanical register extends the maximum count capacity to 9,999,999,999 on the Model DS-740, the four-decade unit. Count capacity of the smaller Model DS-710 is

← For more facts circle 632 on Reply Card

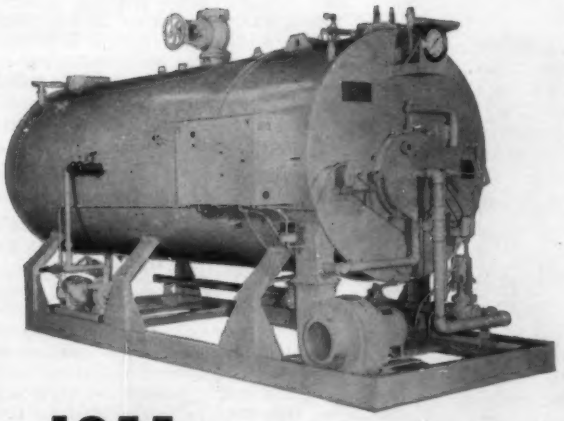
107 YEARS of RELIABILITY ARE BEHIND EVERY AMESTEAM GENERATOR





In your selection of a boiler, it's important to remember — experience *does* count. And what better assurance of top boiler quality do you have than the Ames record: 107 years of building fine boilers — boilers which have given economical, satisfactory service throughout the industry! Many Ames units purchased 40 to 50 years ago are still faithfully on the job. Amesteam Generators always incorporate the latest advances in package boiler design.

Write today for details on these boilers with the proven record of reliability.



1955

AMESTEAM GENERATOR

20 sizes, 10 to 600 H.P., 15 to 200# W.P., oil, gas, or oil-gas combinations with quick fuel switchover feature.

AMES IRON WORKS, INC.
Box M-105, Oswego, N.Y.

Show me how I can benefit from Ames experience and nation-wide organization in getting a top boiler value.

NAME.....

ADDRESS.....

COMPANY.....

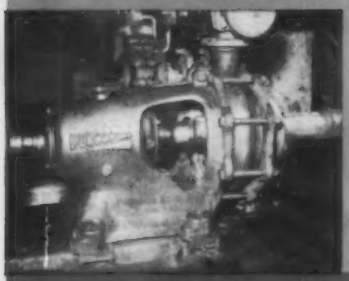
For more facts circle 633 on Reply Card

$793.50 Saved on Three Acid Pumps!

$793.50* has been saved, to date, on these three tough pumping jobs by reduced stuffing box maintenance. These pumps have given continuous, trouble-free service after

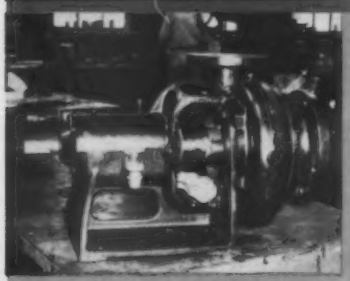
CHEMPRO Mechanical Seals†

were installed. In pump after pump, the Chempro seal has paid for itself in the first few months of service.



1 Durichlor Model X3RG-100 Durco-pump, handling 30% HCl in a dye-stuff plant. This large 2¼" Chempro Style WLC seal has operated for more than eight months without leakage.

2 LaBour No. 20 Type DLP pump unloading tank cars of oleum and 96% H_2SO_4 in a chemical plant. Before installing a Chempro Style WLZ seal, this pump was repacked weekly. The Chempro seal has given more than 11 months of trouble-free service.



3 Worthington 4CNG-84 pump operating on 94% H_2SO_4 in an oil refinery. A No. 175 Chempro Style WLZ seal solved the packing problem after it was installed more than seven months ago and is giving 100% leak-free service.

*Based on users figures. †Patented

Write for new Chempro Seal Bulletin CP551

CHEMICAL & POWER PRODUCTS, INC.

The Original Fabricators of Teflon Packings and Gaskets

7 Broadway, New York 4, N. Y.

For more facts circle 634 on Reply Card

NEW PRODUCTS

(Begins on page 152)

9,999,999. Relay contact closure and negative output pulse of approximately 100 v is provided each time the electronic decade section reaches maximum count. Relay contacts are rated at 5 amp, 115 v, 60 cycles. The Computer Measurements Corp.

87—METAL WORKER is manually operated unit

This machine is said to bend, punch and shear flat and angle metal bars up to 3/16-in. thick and 2-in. wide. It's manually operated. Exclusive of its handle, the Weilands Metal Worker stands 30 in. high, is 6½ in. deep and 6 in. wide; it

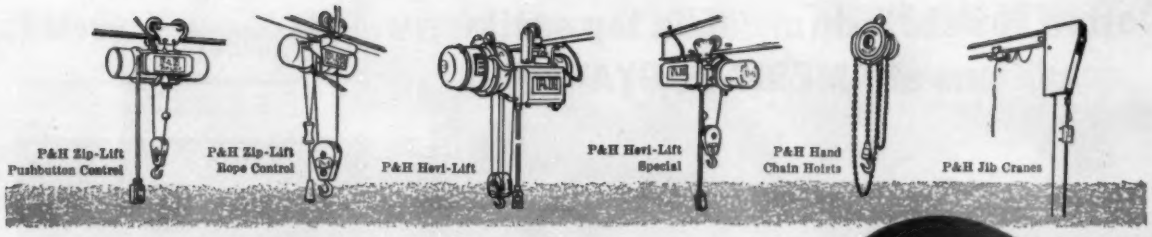
weighs 170 lb. It can be mounted on a wall or attached to a frame or sidewall of a truck for mobile use. The pump-handle linkage produces a thrust of 250 psi, it is explained, and simultaneously operates the bender, bar and angle bar shear, and the punch mechanism. Sets of tool steel dies come with the machine. Among features announced for this metal worker is its capacity to cut both ends square without distortion, fracturing or knurling. Constructed of cold rolled steel, the machine is claimed to handle aluminum, copper, brass, bronze and steel with equal facility. Diesel Power, Inc.

79—HOBBER adapts itself to existing tooling

An "alternate" design is announced for this manufacturer's No. 1 Small Gear, Precision Hobbing Machine, which adapts it to the use of existing tooling regardless of style or make of hobbing machine for which the tooling was constructed. This design is optional and at no extra cost, it is stated. It eliminates the money loss occasioned by scrapping of existing work holding fixtures in order to acquire this machine's feature of independent selection of speeds, feeds and indexing. The Hamilton Tool Co.

80—REPAIR STICK for damaged galvanized surfaces

ReGalv is announced as an improved metal alloy stick for regalvanizing areas where the zinc coating (of galvanized



New...

P&H Hoist Rectifier Brake

...saves money by eliminating linkage and simplifying adjustment problems

P&H Hoist engineers built three basic improvements into this new rectifier brake: (1) They eliminated linkage — so there are less parts to suffer wear. (2) They simplified the adjustment operation so that it can be performed by a single turn of a collar on a threaded hub. (3) They reduced the armature stroke and shifted the brake contact from the magnetic core to the outer rim of the brake pot — eliminates peening the core metal.

Old-style brakes slapped back with an armature stroke of as much as ½" or even ⅞". On the new P&H rectifier brake, the stroke is only .030" to .035".

Instead of linkage, four springs compress the revolving and stationary discs when the motor is deenergized. The adjustment collar is notched to engage a spring-loaded catch which holds any given setting. The single adjustment can be made quickly and easily.

These three basic changes add up to time and money saved in maintenance. A test model of a hoist using this new brake ran for two years without one minute of maintenance time charged against it — and it's still going strong!

Sure we'll send one of our sales engineers to see you. He will give you complete information on the new P&H rectifier brake, and news of how you can adapt this feature to your present P&H equipment. Just use the handy coupon below.

Tear out and mail today!

P&H Hoists
HARNISCHFEGER CORPORATION
4696 West National Avenue, Milwaukee 46, Wisconsin

Gentlemen: Get a man on the job. We'd like to see him.

Name.....
Title.....
Company.....
Address.....
City.....Zone.....State.....

2806

P&H HOISTS
HARNISCHFEGER CORPORATION
4696 W. National Ave. • Milwaukee 46, Wis.

For more facts circle 635 on Reply Card

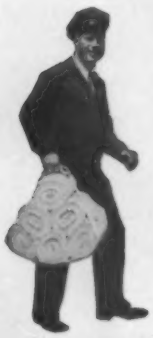
Cotton Towels* help maintain top sanitary conditions at AMERICAN CYANAMID

*Fairfax Towels used by American Cyanamid Company are supplied by Consolidated Laundries Corporation

● The American Cyanamid Company is one of the world's largest manufacturers of chemical intermediates for the chemical processing industries. The main plant at Bound Brook, N. J. alone houses 3600 employees; and company executives spare no effort that will help insure the safety, health and welfare of their personnel. And since the very nature of the work done at Bound Brook calls for good sanitary conditions, it's no surprise to find Fairfax towels in the washrooms.

The soft, absorbent qualities of cotton towels are really appreciated by American Cyanamid's employees. And from management's viewpoint cotton towels mean freedom from storage and inventory headaches; reduced fire hazard; cleaner, tidier washrooms, lower maintenance costs.

So follow the lead of top-flight management everywhere—give the towel job to cotton in your office building, plant or institution. Write for free booklet which explains how cotton towel service will help you. The address: Fairfax, Dept. P, 65 Worth St., New York 13, N. Y.



Here's How Linen Supply Works...

You buy nothing ... your linen supply dealer supplies everything. The low cost includes cabinets, pickup and delivery, provides automatic supply of freshly laundered towels and uniforms. Quantities can be increased or decreased on short notice. Local service is listed in your classified book under LINEN SUPPLY or TOWEL SUPPLY.

Clean Cotton Towels...

Sure Sign of Good Management

Fairfax Towels

A PRODUCT OF WEST POINT MANUFACTURING CO.

WELLINGTON SEARS CO., SELLING AGENTS, 65 WORTH STREET, NEW YORK 13

For more facts circle 636 on Reply Card

NEW PRODUCTS

(Begins on page 152)

sheets, shapes, fittings etc.) has been damaged or destroyed by welding, flame-cutting, bending. The stick is said not to crumble and may be rubbed over the weld or other hot surface to be coated. It melts and bonds at temperatures as low as 600 F, says company, and no pretreatment is required other than knocking or brushing off loose scale. The coating provided by ReGalv is claimed to be as tough, as corrosion resistant and as adherent as the original galvanizing—and to outlast the original galvanizing. RotoMetals.

81—POWER CUTTER is multi-purpose machine

Described as a sheet metal shop in one unit, the Nordex Power Cutter is offered as an inexpensive machine which can be adapted to special operations. It has a

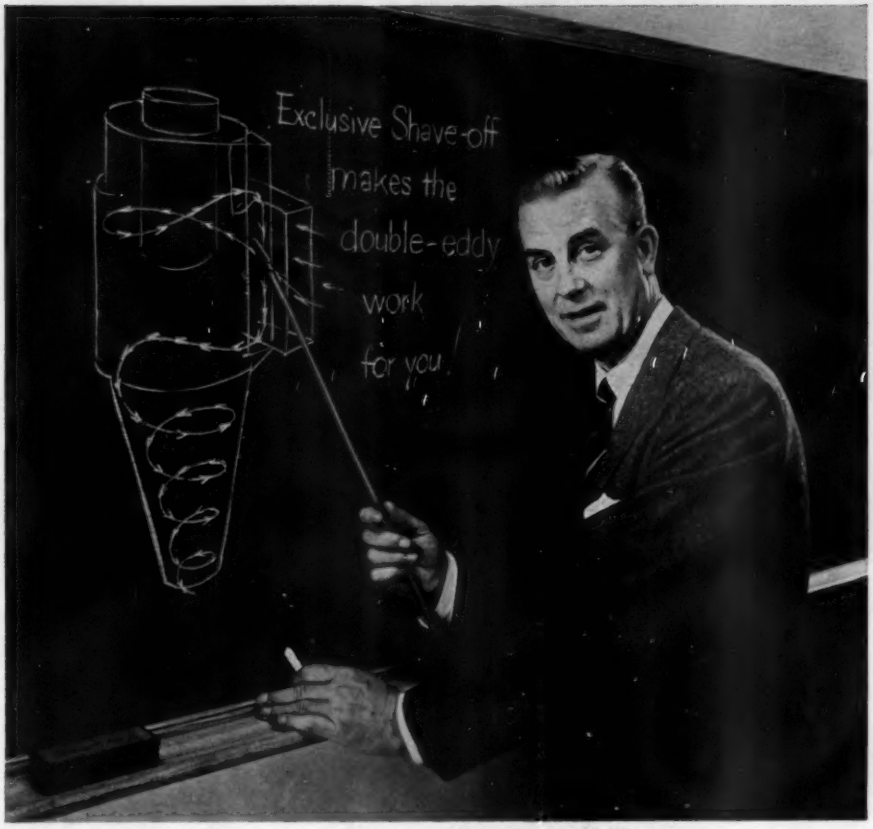
detachable crank case for interchanging advantages, replacement and repair convenience. Quick changes of tools make the machine available for straight cutting, circle cutting, louvre cutting, beading, folding and doming. Other operations can be performed with special tools. The cutter comes with a 28½- or 48-in. throat and has a variable stroke adjustment. It is powered by a ¾ hp totally enclosed ball bearing motor, 110/220 v, single phase, 60 cycle. Only 13 in. wide and 33 in. high, the cutters are 50 and 72 in. in length. Nord Corp.

82—SPRAY PRODUCT for seasonally used pumps

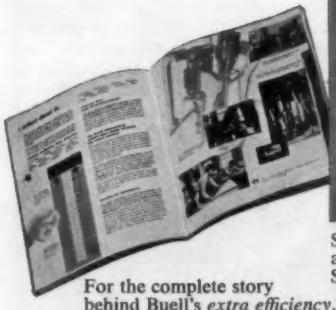
Pump-Aid is claimed to prevent sticking of seasonally operated pumps such as those used for air conditioning water recirculating equipment and auxiliary pumps. Corrosion continues in such pumps which are drained for shut-down periods, it is explained, and this causes sticking of close tolerance surfaces when the pumps are called upon to operate the following season. To protect against this, Pump-Aid is injected under pressure through the drain hole in the pump housing cavity immediately after the pump is drained.

Pump-Aid comes in an aerosol canister using a Freon-type propellant to afford a generous coating over all surfaces. The product is also claimed beneficial in preserving Neoprene, rubber and

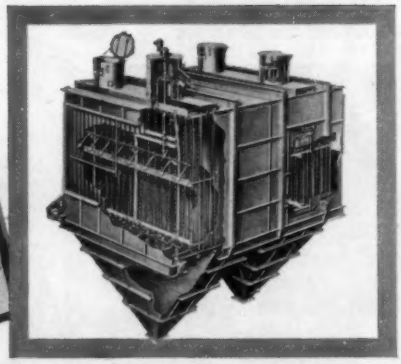
How Buell delivers the EXTRA PERCENT in Dust Collection Efficiency



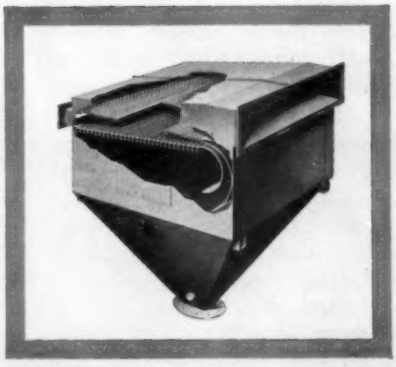
In any cyclone dust collector there is an upward eddy preventing the separation and dropping-out of a percentage of particles. But in Buell Cyclones, the exclusive Buell shave-off design *harnesses* this up-flow—puts it to work! Result: extra efficiency without extra operating cost!



For the complete story behind Buell's *extra efficiency*, write Dept. 14-J, Buell Engineering Company, 70 Pine Street, New York 5, N. Y.



SF Electric Precipitator, a Buell exclusive, also delivers *extra efficiency* due to unique Spiralectrodes and continuous cycle rapping.



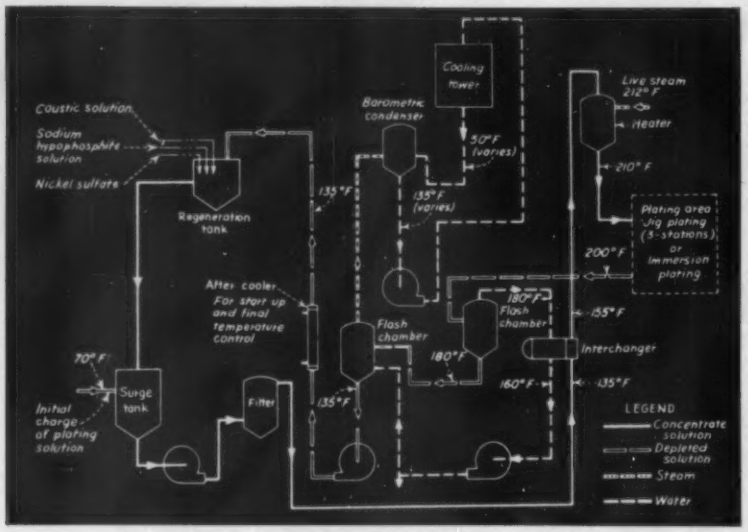
Buell's Low Resistance Fly Ash Collector combines top efficiency with low draft loss, for either natural or forced draft installations.

buell®

MECHANICAL ELECTRICAL

Experts at delivering Extra Efficiency in **DUST COLLECTION SYSTEMS**

For more facts circle 637 on Reply Card



Here's the flow chart of a process that couldn't operate without the use of PYREX *brand pipe to guarantee free-flowing, unclogged fluids handling. It's the Alcoplate chemical nickel-plating process.*

This process could not work . . . without the unique properties of glass pipe

This chemical nickel-plating process, used by Alco Products, Inc., depends on the use of glass pipe.

Nickel would settle out on metal pipe and soon stop the flow. Glass pipe stays open, and the process is successful.

In this case, PYREX brand pipe was selected because of a *unique* advantage over all other kinds of pipe. But the majority of users choose PYREX brand pipe because of its *relative* superiorities.

For example, PYREX pipe is superior in resistance to corrosion. It is corrosion resistant to more acids and acidic solutions than any other corrosion resistant piping.

Smooth and hard, it resists buildup of sediments, gives no grip for solid matter.

And PYREX brand pipe gives you visibility—you can check your process by visual inspection.

Why not check both the unique properties and the inherent superiorities of *glass* pipe against the special needs of your own processes?

To learn more about the unique pipe that's served industry for over 30 years, send for literature.

Corning means research in Glass

CORNING GLASS WORKS, 31-10 Crystal Street, Corning, N. Y.

Please send material on PYREX brand glass pipe.

Name ..... Title .....

Company .....

Address .....

City ..... Zone ..... State .....

For more facts circle 638 on Reply Card

NEW PRODUCTS

(Begins on page 152)

graphite type seals. It has many other advantages, according to manufacturer: it will not evaporate or freeze; it requires no special preparation for use and adheres to surfaces until flushed off. It is also claimed non-toxic and water soluble, so it needn't be drained off at start of season. Pump-Aid sells for around $3.00 a can. Garman Co., Inc.

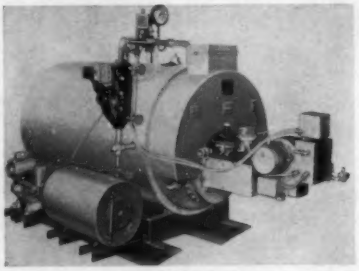
83—CAM VISES for use on production equipment

This line of cam vises specifically built for use on production equipment is announced as to affording quick and easy operation on milling machines, shapers

and drill presses. Vise bodies are machined from special alloy castings that are stronger than cast iron, company says, and as shock resistant as steel. Four models are available: 4-in. jaw width with 5/32 or 3/8 in. cam throw, and 5-in. jaw width with 5/32 or 3/8 in. cam throw. Jaw depth is 1½ in. with keyways 5/8 in. wide and 1/8 in. deep. Special jaws in any size are available. Modern Tools Div., Nelco Tool Co., Inc.

84—PACKAGE BOILER features compact design

Announced as ideal for all industries requiring steam for heating, power and processing, this complete package unit Scotch Marine Boiler features compact design, quick installation, fast streaming,



portability, and low maintenance among its chief advantages. Boiler shell is a horizontal steel cylinder with flat flanged heads in each end, being mounted on structural steel skids. Furnace is a horizontal steel cylinder within the shell and

Prompt Service

SLINGS · WIRE ROPE · ASSEMBLIES

Your wire rope needs, whether they be for Round-Braided Slings, Cable Assemblies, or Wire Rope, are given prompt service by Macwhyte Company distributors.

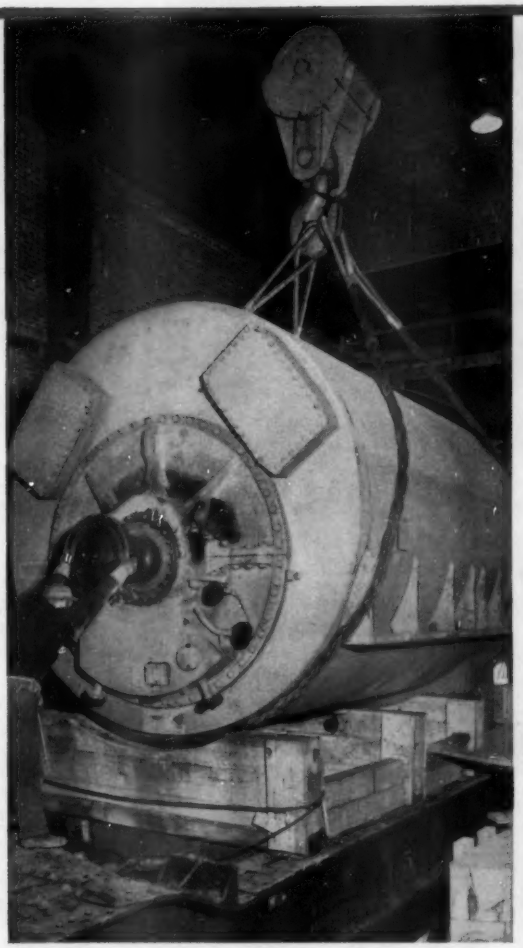
Macwhyte manufactures a wide variety of sizes and types to provide materials best suited to your needs.

MACWHYTE

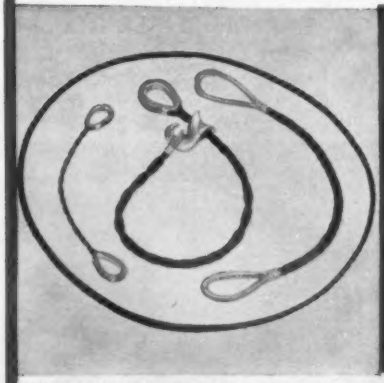
SLINGS · WIRE ROPE · ASSEMBLIES

Macwhyte Company, 2991 Fourteenth Avenue
Kenosha, Wisconsin

Mill depots: New York 4, 35 Water Street
Pittsburgh 19, 704 Second Avenue
Chicago 6, 228 So. Desplaines Street
St. Paul 14, 2356 Hampden Avenue
Ft. Worth 1, P. O. Box 605
Portland 9, 1603 N. W. 14th Avenue
Seattle 4, 87 Holgate Street
San Francisco 7, 188 King Street
Los Angeles 21, 2035 Sacramento

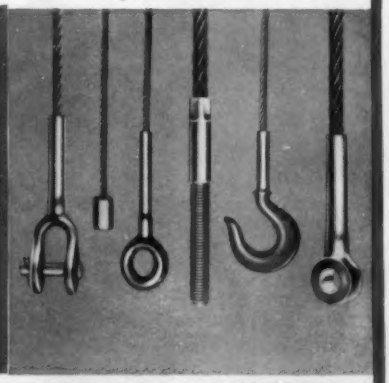


ROUND-BRAIDED SLINGS: Two Macwhyte ATLAS Round-Braided Slings handling 125-ton generator unit. These are Type No. 1 Slings made of alternate left and right lay wire rope, braided for light weight, maximum flexibility, and safety.



SLINGS: Macwhyte makes a wide range of sizes and types of Braided and Single-Part wire rope slings. Custom designs are made to meet special needs. For information, ask for Catalog S-8.

WIRE ROPE: There is a right rope for each equipment need. Catalog G-16 lists all classifications and sizes, also included is general information on handling and use of wire rope.



ASSEMBLIES: Macwhyte "Safe-Lock" Wire Rope Assemblies are made in a wide range of sizes, with fittings permanently attached to one or both ends. Many standard types are listed in Catalog No. 5201.

10855W

For more facts circle 639 on Reply Card

RCA high-power rectifiers give long-life service at Weirton Steel Company—a division of National Steel Corporation

Tin reflow on steel strip, averaging 30" in width, is achieved with amazing speed, quality, and economy at Weirton Steel by means of electronic heating. Moving at the rate of 1,300 ft. or more per minute, the steel strip passes through high frequency heating coils, fed by a group of 200 kw electronic oscillators, which reflow the tin, producing a high quality coating.

To supply the oscillator plate power for this high-speed electronic operation, Weirton uses 24 RCA 857-B's in two banks of 12 tubes each. This rectifier installation has given an average tube life of 12,000 hours...a period representing about 2½ billion square feet of strip production.

Here is another example of the way RCA Tubes are helping industry do a better job at lower cost.

• • •

When you need power tubes, rectifiers, ignitrons, thyratrons, computers, phototubes, or RCA Tubes of any type, call your RCA Tube Distributor. (He's listed in the Thomas' Register.) For tube technical data, write RCA, Commercial Engineering, Section J-34-T, 415 S. Fifth Street, Harrison, N. J.

RCA ***RADIO CORPORATION of AMERICA***
ELECTRON TUBES ***HARRISON, N.J.***

For more facts circle 640 on Reply Card

NEW PRODUCTS

(Begins on page 152)

extends from front to rear head. Tubes are of standard gage and extend through front and rear heads, completely covered with water at all times. Combustion chamber is just beyond rear head and is lined with suitable refractory material. Smoke outlet and connection for stack is at top of smokebox and has a damper installed with adjustment position.

Designed for 100 lb working pressure, boilers are supplied with power or atmospheric gas burners, completely assembled and electrically wired in factory. Modulation valves are supplied on burners at extra cost. A water column type pump and low water cut-off control is included. Control electrically operates gas valve on boiler steam pressure — closing or opening on pressure-rise or pressure drop. All electrical wiring is assembled at factory and is equipped with switch box for 110 v. Williams & Davis Boiler & Welding Co., Inc.

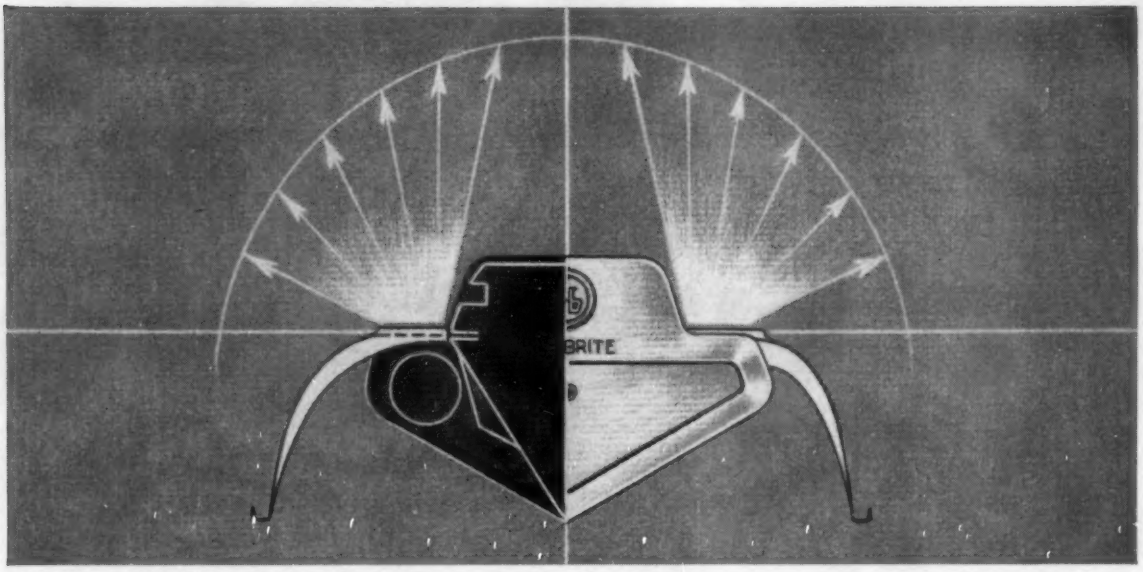
85—AUTOCLAVE features "push button" operation

Timer, heat control, cycling control, air control, water control, steam control and opening and closing mechanism are automatic in this autoclave. It maintains constant pre-set temperature during all its cycles and records a written record of each complete cycle, says manufacturer, and the automatic controls afford accuracy of both heating and cooling, during the curing and cooling cycles. Hydraulic operation raises, lowers and locks the lid as required by the pre-set cycle on which the machine is operating. The locking mechanism is automatic, too; and in case of power failure, manual controls are provided to allow removal of the part being processed. One man and a helper can operate up to eight such autoclaves, it is pointed out, because once started, everything is automatic. Philips & Davies, Inc.

86—CARTON SEALER is efficient and economical

The Lezam Gluer is designed to seal cartons securely, it is announced, and make the cartons neater and safer in

transit. Using low-cost liquid glue, it can dispense the adhesive in an even coat to any size area. Additional economies are speed and ability to use ungummed labels. Portable unit weighs about 5 lb, when filled with 1 qt of adhesive. It costs less than $40. Ever-Seal Industrial Glues, Inc.



New Day-Brite upward lighting *achieves new production highs*

Visual tasks are becoming more and more acute as industry adopts new production techniques. Unusual accuracies, extreme tolerances, delicate color separations and speedy readings of charts and graphs demand the most in "see-ability" and the least in eyestrain. Both are supplied by Day-Brite new CFI (*C*omfort *F*or *I*ndustry) lighting—especially developed to establish a high degree of visual comfort for industry workers.

Radically different lighting system

The Day-Brite CFI principle differs radically from previous design and application practices. Slotted apertures are introduced *in the tops* of the fixture reflectors—a calculated portion of the available light is directed *upward* toward the ceiling. Harsh ceiling contrasts are washed out—"hot spots" of light eliminated. Advantage is taken of the reflectance values of lighter-colored walls and ceilings. Thus, visual strain and discomfort are largely avoided—eye shock is minimized—nervous and muscular tensions are lessened. Greater accuracies are possible—spoilage is reduced—accident rates are lowered—higher standards of production are realized.

Longer life... lower maintenance

Several additional values are built into Day-Brite CFI units: (1) Cooler operation and consequent longer lamp and ballast life result from natural updraft ventilation; (2) This updraft ventilation helps keep reflectors clean—less maintenance and more light value result.

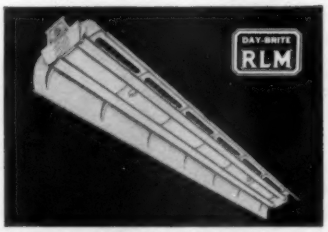
Two types of Day-Brite CFI fixtures

There are two types of Day-Brite CFI fixtures—the CFI-10, which provides for 10% *upward* lighting; the CFI-25, designed for 25% *upward* light distribution. Each of these fixtures is applicable to such installation surroundings as ceiling heights, wall and ceiling reflectances and the requirements of the visual task.

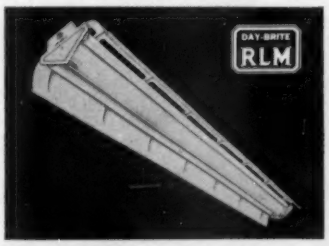
Take a look at the "comfort quotient" of the lighting in your plant. SEE, EXAMINE and COMPARE Day-Brite with any other lighting unit. Look at the fixtures, not just the pictures.

CALL YOUR DAY-BRITE LIGHTING REPRESENTATIVE. OR, SEND FOR CFI BULLETINS.

Day-Brite Lighting, Inc.,
5439 Bulwer Ave., St. Louis 7, Missouri



Day-Brite **CFI-10,** with 10% upward lighting component.



Day-Brite **CFI-25,** with 25% upward lighting component.

5480

NATION'S LARGEST MANUFACTURER OF COMMERCIAL AND INDUSTRIAL LIGHTING EQUIPMENT

For more facts circle 641 on Reply Card

The new line of **ALGAS**

LP-Gas Vaporizers, Vaporizer-Mixers and Mixers Only...For Use by UTILITIES and INDUSTRIES

To meet an increasing demand for an automatic self-contained LP-Gas plant, ALGAS has developed this new line of vaporizers, mixers and vaporizer mixers. This equipment is engineered and manufactured for outdoor, year 'round service; for any B.T.U.; for high or low pressures. ALGAS is also a specialist in engineering and manufacturing LP-Gas plants for utility use or peak load shaving. Write today for information on equipment to meet your requirements.

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Established 1932

Complete LP-Gas Stand-By Plants For Utilities or Industry.

AMERICAN LIQUID GAS CORPORATION

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Please send information regarding:

☐ LP-Gas Vaporizers, Vaporizer-Mixers and Mixers Only.

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NEW BOOKS

for the plant engineer

Dealing With People

PERSONNEL MANAGEMENT by William H. Knowles, Michigan State College. Size 8¼ by 5½ in.; 488 pp; cloth bound. Published by American Book Co., 55 Fifth Avenue, New York 3, N. Y. Price $4.50.

WITH PLANT ENGINEERING staffs on the increase, the plant engineer will find several chapters in this book helpful in supervising his people.

It is always interesting to get another person's viewpoint on the history and growth of management-labor relations. The author presents a brief but comprehensive report on this in the very first chapter.

A number of the points discussed in chapter three on industrial psychology will be of help to any person in a supervisory capacity, as well as chapters nine and ten on securing cooperation and industrial morale.

Other chapters consider the union-management problems in addition to job evaluation and merit rating, work loads and incentives and profit sharing and guaranteed wages.

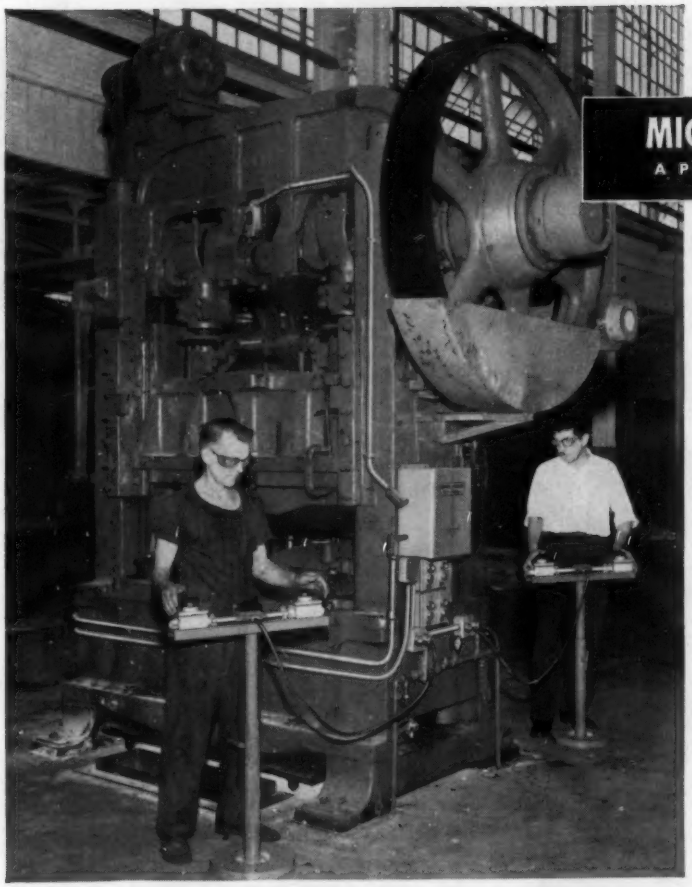
On Supervision

MANAGEMENT REPORTS. Size 11 by 8½ in.; paper bound. Published by Research Division, California Personnel Management Association, Farm Credit Bldg., 2180 Milvia St., Berkeley 4, California.

MAKING MANAGERS OUT OF SUPERVISORS, Report No. 214, 8 pp. In this paper, Arthur C. Croft, who is past-president of the American Arbitration Association takes up the case of the people who are on the first rung of the company management ladder. He calls on top company officials to take steps in behalf of this supervisory element. He points out a system of management used by one well known firm which helps bring about smoother company operation as well as better appreciation of supervisory responsibilities.

HOW TO LEAD MEN—Report No. 219, 10 pp. This is a stenographic brief of a panel discussion. The group covers various concepts of training needs and mentions actual plant experiences. The concensus was that leadership goes beyond elementary training efforts and is actually a graduate study in everyday business relations.

THE SUPERVISOR'S JOB TODAY—Report No. 207, 14 pp. This paper was prepared by H. T. Lintott, a management consultant, as a primer for supervisors



MICRO SWITCH Trip Control
A PRINCIPLE OF GOOD PRODUCTION

● Both hands of each operator are required before this press will work. Shown also is MICRO SWITCH Trip Control box (center) and below it the lockouts which can provide for operation by four men if necessary. Scene is Kenosha plant of American Motors Corporation.

SAFETY Big Factor in American Motors Choice of MICRO SWITCH Trip Controls

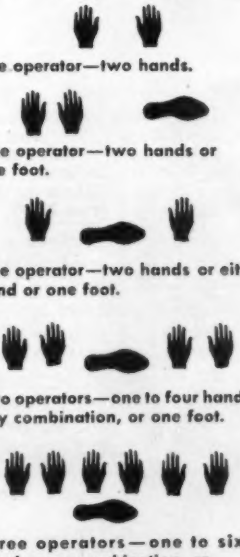
Whether a press is operated by one, two, three or four men, MICRO SWITCH Trip Controls make sure it cannot operate until EVERY MAN is at his safety station.

That's the kind of SAFETY that plant engineers of American Motors demanded for their Kenosha, Wisconsin stamping presses. Experiments were conducted for two years before MICRO SWITCH Trip Controls were installed on every press in their block-long press department.

The American Motors set-up includes the use of MICRO SWITCH Trip Controls to provide for a wide variety of applications. They are used for single operator control of heavy positive mechanical clutch machines; operation by any number of control switches with lock-out switch selection of any desired number; and with friction clutch machines.

Let us send you complete information on MICRO SWITCH Trip Control and the name of the distributor nearest you.

Wide Variety of Press Control Methods Available



1 One operator—two hands.

2 One operator—two hands or one foot.

3 One operator—two hands or either hand or one foot.

4 Two operators—one to four hands, any combination, or one foot.

5 Three operators—one to six hands, any combination, or one foot.

6 More than six hands, any combination, or one foot.

INCREASED PRODUCTION

Instant electrical response

●

Feather-touch operation

●

Easy control changes

●

Decreased operator fatigue

INCREASED SAFETY

Two hand operation

●

Cannot be "cheated"

●

Inoperable if any component fails

●

Interlock prevents power stroke while changing dies

See MICRO SWITCH Trip Control
BOOTH 174
43rd National Safety Congress & Exposition
Chicago, Illinois • October 17-21, 1955

MICRO SWITCH
A DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR COMPANY
In Canada, Leaside, Toronto 17, Ontario • FREEPORT, ILLINOIS

H HONEYWELL

For more facts circle 643 on Reply Card

and foremen on the basic management functions that are expected of supervisory people. The paper defines the management responsibility that they should assume.

Air Conditioning

TRANE AIR CONDITIONING MANUAL. Size 11¼ by 9 in. 380 pp including index; illustrated; cloth bound. Published by the Trane Company, La Crosse, Wisconsin. Price $6.50.

PRACTICING and undergraduate engineers are offered this fine manual on air conditioning in a new edition which has a number of revisions. It is the twenty-first printing of the book which has undergone a third major change.

The publication has a practical approach and avoids involved theoretical discussions. It begins with a basic treatment of heat and continues into heat gains. Various conditions of heat transmission are presented and clarified with the use of sample problems and solutions.

In another section, the psychometric chart is discussed extensively and some instructions are given on the use of the Trane Air Conditioning Ruler in conjection with the chart. Incidentally, one of these rulers, a supply of psychometric charts, and a number of estimate sheets for cooling and heating loads are included with the book. In addition to this, there are separate instructions on the use of the Trane ruler which is used only with a Trane psychometric chart.

In one main section refrigeration for air conditioning is given comprehensive treatment covering such items as refrigerants, compressor capacity, volumetric efficiency, superheated refrigerant vapor, condensers, cooling towers, piping and automatic controls. Other sections consider the subject of water for air conditioning, ducts, fans and calculations for the conditioned air supply.

In the back of the book, there is a collection of tables which cover specific heat of various substances, steam properties, heat transfer coefficients, design temperatures, refrigerating capacity and other items.

THIS FREE BULLETIN EXPLAINS HOW CATHODIC PROTECTION WILL STOP CORROSION OF BURIED OR SUBMERGED STRUCTURES IN YOUR PLANT

Write for Bulletin No. E-34

ERP CATHODIC PROTECTION SINCE 1935

ELECTRO RUST-PROOFING CORPORATION
30 MAIN STREET, BELLEVILLE 9, N. J.
ATLANTA CHICAGO DALLAS MONROVIA SEATTLE

E-34

For more facts circle 644 on Reply Card

Plastics

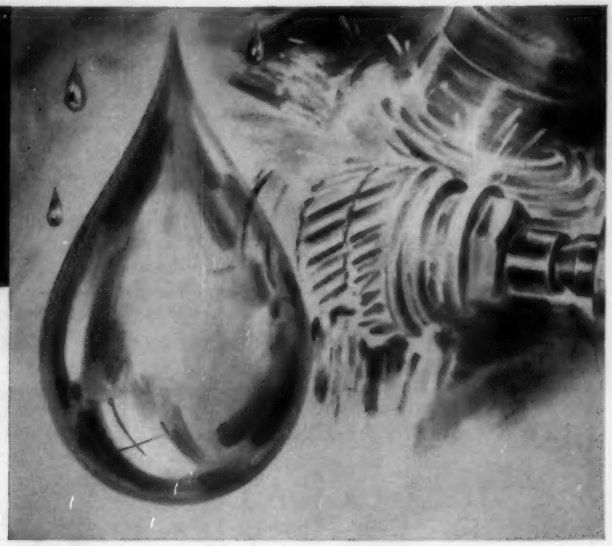
PLASTICS IN BUILDING. Size 11¼ by 8⅝ in.; 149 pp; illustrated; cloth bound. Published by Building Research Institute, National Academy of Sciences and National Research Council, Washington, D. C. Price $5.00.

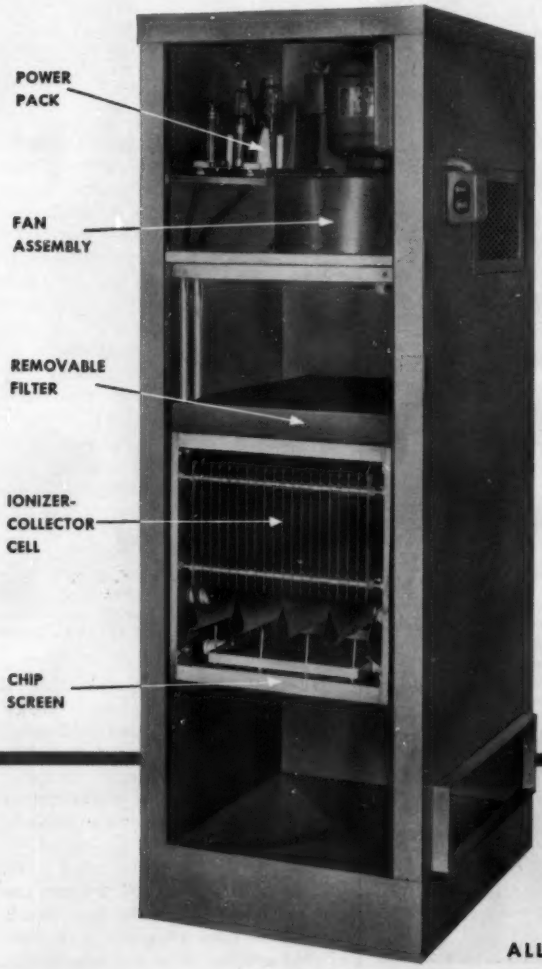
INFORMATION in this book is based on discussions and presentations at a conference in the fall of last year. It contains papers presented by speakers from a number of firms which have experience with plastics. Among the companies represented at the conference were the following: E. I. du Pont de Nemours and Co., Inc., Owens-Corning Fiberglas Corp., Rohm & Haas Co., The Dow Chemical Co., The Bakelite Co., and Monsanto Chemical Company.

Some of the topics that are covered in this book are as follows: physical and engineering properties, glazing and interior illumination, plastics in structural panels, surfacing and decorative uses in buildings,

Electro-Staynew Mist Collector

eliminates oil mist and smoke at the source . . .





A compact, self-contained ventilating system for individual machine tools

CLEANS AIR ELECTRONICALLY

Electro-Staynew Mist Collectors are specifically designed to be mounted on or near high speed machine tools. These Dollinger-engineered, electrostatic filters draw contaminated air from around grinding or cutting operations, *remove* over 90% of the oil mist and smoke, and then return clean air to the shop. Look at these exclusive advantages:

- **UNIT CONSTRUCTION**—Ionizing and collector cells are combined into one unit; thus only one unit to service.
- **EASE OF INSTALLATION**—needs only electrical and duct connections.
- **DEMOUNTABLE COMPONENTS**—all components can be removed easily without tools.
- **ADVANCED SAFETY FEATURES**—assure complete protection of personnel.
- **MINIMUM MAINTENANCE**—designed to be practically self-cleaning.

For complete information, write today for Bulletin 420.

DOLLINGER MIST COLLECTOR ELECTRO-STAYNEW

DOLLINGER

CORPORATION • 55 Centre Pk., Rochester, N. Y.

ALL TYPES OF FILTERS FOR EVERY INDUSTRIAL NEED

For more facts circle 645 on Reply Card

piping, ducts and conduits. The appendix includes a discussion of the building code regulation of plastic building materials.

Production Problems

COMPANY APPROACHES to Production Problems. Number 220, Manufacturing Series; size 9 by 6 in.; 88 pp; paper bound. Published by American Management Association, 330 West 42nd St., New York 36, N. Y. Price $1.75 non-members, $1.00 members.

ONE OF THE principal sections of the booklet pertains to inventory control and management. It contains papers by several authors representing different industrial activities, namely appliance manufacturing, instrument making, machine tool manufacturing, and food processing. Among the topics discussed are the dimensions of inventory, specifically volume, value, and time. Consideration is also given to the subject of production rate adjustment to take care of fluctuations in demand.

The paper relating to the operations of the instrument maker covers some of the duties of the inventory control department. Much of this company's work is for the government. The author touches briefly on some of the procedure that is involved. In the machine tool maker paper, use of the company's control chart is explained with the aid of a sample form.

Other sections in the publication relate to the coordination of the traffic department with other departments. Attention is also given to the traffic function organization and to warehousing.

Electronic Computors

ELECTRONIC DATA PROCESSING in Industry—A Case Book of Management Experience. Size 9¼ by 6¼ in.; illustrated; 257 pp; cloth bound. Published by American Management Association, 330 W. 42nd St., New York 36, N. Y. Price $7.75.

ELECTRONIC MACHINES are helping man increasingly in keeping better and faster track of industrial and commercial activities. They perform such functions as multiplying, adding, classifying, sorting and recording with amazing accuracy. However, before they are actually put to use by an interested firm, a certain amount of groundwork must be done to justify their use.

This book tells how several companies studied their particular conditions prior to the installation of this type of equipment. Approaches of two companies considered in the book consisted of a restricted survey and a two year research program respectively.

The type of machines that are available are discussed in the book with comments on the reliability in electronic data processors. Officers of three different companies present their firm's experiences with the small, medium and large computor. The book also includes material on a number of applications of computors along with a glossary of programming terms.

Arc Welding Simplified

SELFWELDING by L. H. Houck. Size 8⅞ by 6 in.; 128 pp; illustrated; cloth bound. Published by the Lincoln Electric Company, Cleveland 17, Ohio. Price $1.00.

HERE IS A PUBLICATION that is meant for the "do-it-at-home" welder. It tells him how to select and install equipment in the home workshop. The welder unit power supply wiring is discussed briefly as well as information is given on welding by the Selfweld Method.

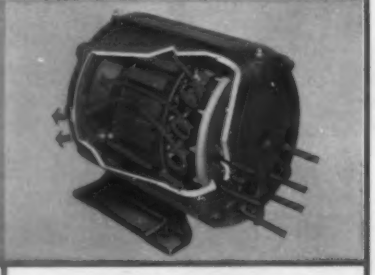
Much of the book is devoted to the presentation of about 80 projects that can be undertaken in the home workshop. Directions are given in the form of photographs, plans and suggestions.

To PLANT ENGINEERS, Howell suggests

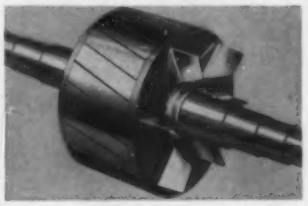
What to look for in the new Rerated Open Motors

Besides the compactness, lighter weight to handle and ship, and the lower cost in many h.p. ratings that the rerated motors give you, why not look for evidences of *all-around* modernization in motor design? New ventilation principles, real streamlining, and better bearing protection, for instance. Compare the Howell Series 100 motors — a few details on the open drip-proof construction are shown below — and you'll *have* what you're looking for!

VENTILATION . . . "Cool running" means long life in motors. The steel shell of a Howell motor and a new stator design with the largest air passages yet devised put ample ventilation where it's needed. Compare!



BEARINGS . . . They should be fully protected. Dirt can't enter Howell's double shielded bearings either from inside or outside the motor, because they are sealed in the end plate cavities by dust-tight inner caps. Compare!



COPPER-CLAD ROTORS . . . Howell motors have copper-clad rotors. This means better heat conductivity, stability at high temperatures and, as opposed to die-cast rotors, greater design flexibility to meet your special requirements. Compare!

In addition to the open-drip type shown here, Howell Series 100 motors are made in splash-proof, weather-protected and TEFC enclosures; also as the power units of Howell gearmotors and brake motors.

WRITE FOR BULLETIN S-100-B

HOWELL MOTORS

HOWELL ELECTRIC MOTORS COMPANY, HOWELL, MICH.
Precision-Built Motors for Industry Since 1915

HOWELL Star Band motors

For more facts circle 646 on Reply Card

NEW H-5

1/2-YD., 9-TON

BUCYRUS-ERIE COMPANY
South Milwaukee, Wisconsin

Gentlemen:
Send me your new H-5 Bulletin. This crane interests me for _____ work.
(type of job)

Name _____
Company _____
Title _____
Address _____
City _____ State _____

91H55

Hydrocrane Mounts on Conventional Truck

Completely new from outrigger feet to boom tip, this powerful 9-ton, ½-yd. Hydrocrane brings you work ability of heavy carrier-mounted cranes at small crane cost. Patented hydraulic outriggers permit mounting crane-excavator on a commercial motor truck, new or used, without sacrificing any basic crane working capacity.

Check these outstanding advantages—

Unmatched precision control of loads.

High-lift, three-piece boom (extra equipment at added cost) gives you 50 feet of reach, retracts hydraulically to 25 feet for travel. Boom and hydraulic fittings can be connected and machine working in less than ten minutes after arrival at job site.

12-ft. telescoping boom action—from 24 feet to 36 feet for standard two-piece boom, from 38 feet to 50 feet for high-lift boom, plus 20-ft. jib extension.

50-mph top highway speed.

Every work function fully hydraulic.

Up to 240-fpm line speed.

Available with clamshell, crane hook, magnet.

Optional remote truck control from crane cab.

Meets highway laws for over-all length and axle loads (depending on truck selection).

See it in action

Find out what the new H-5 Hydrocrane can do for you. Ask your Bucyrus-Erie distributor for a demonstration.

BUCYRUS-ERIE COMPANY
1880 South Milwaukee, Wisconsin **1955**
75 Years of Service to Men Who Shape the Earth

New truck, inexpensive used truck, a truck you now own—the new H-5 Hydrocrane can be mounted on any standard commercial truck you choose.

For more facts circle 647 on Reply Card

Simplified Maintenance Standards

(Continued from page 91)

performed, but to the problem of applying standards.

As a result of this procedure, our pipe shop production checker, Jack Thompson, who now handles the 30 men who work out of the pipe shop, is about ready to take on a ten-man pipe covering crew. This will give him a total of 40 men. Usually another good standards combination is that of the carpenters with the painters.

Now, how about the cost of developing these standards? In the past, that has taken a long time and has been very costly. However, with simplified maintenance standards, it took George Moore, the standards supervisor and Jack Thompson, the pipe shop checker, both of whom had some time study training, three weeks to develop the standards and one week to develop the application procedure. They did it under the part-time supervision of an industrial engineer from the consulting firm engaged to do the job.

This was possible because the consulting firm supplied predetermined standard data such as that shown in Figs. 4 and 5. George Moore and Jack Thompson made time studies on a number of typical jobs of different length and covering different types of work. No effort was made to check individual standards, but total standard hours from the time studies were compared with standard data total standard hours for each job.

Several advantages were derived from doing this. First of all, it gave the two men who were going to be using these standards an opportunity to get some detailed first-hand knowledge of the pipe shop procedures, organization, personnel, equipment and practices. Second, it gave them a thorough understanding of what work was covered by the various operation standards. Third, it gave them an opportunity to learn how these operation standards would be applied. And fourth, it afforded them an opportunity

"Claude has been careless several times."

to discover any special local procedures or practices for which additional standard data might have to be developed in order to be able to cover 100 per cent of the work with standards. Usually, there will be a relatively small amount of this local standard data required.

In reality, simplified maintenance standards are predetermined standard times, supplied by a consulting firm, installed under their direction, at a reasonable cost which can be quickly recovered by the proper application and use of the standards. Many valuable by-products in the form of control information and procedures, preventative maintenance programs, supervisory training in good management practices and others of a similar nature inevitably grow out of this type of program and make it an invaluable management tool for the plant engineer and the maintenance foreman.

How large an organization do you

It's Hot·Dip Galvanized

Wherever iron and steel products are installed, rust is a problem. Hot Dip Galvanizing solves this problem once and for all. Here are a few of the many items that are Hot Dip Galvanized: steel plates, frames, wire baskets, duct work and many others. You, as a fabricator of steel products, are interested in protecting them from rust. The best way is to have them Hot Dip Galvanized. Here's why: with Hot Dip Galvanizing you get the thickest, most uniform coating with no open pores to let rust begin—thus costly maintenance over a period of years is reduced to a minimum and necessity for replacement is eliminated.

When you have a rust problem choose Hot Dip Galvanizing —the best rust protection you can buy. For the best in galvanizing send your products to a member of the American Hot Dip Galvanizers Association. He has the know-how to give you a top quality job.

Send today for our new booklet "Stop Rust." It gives you the full story on the process, plus a comprehensive coating comparison chart. "Must It Rust" 16 mm film available for showing.

AMERICAN HOT-DIP GALVANIZERS ASSOCIATION

1506 FIRST NATIONAL BANK BLDG., PITTSBURGH 22, PA.

For more facts circle 648 on Reply Card

Hard-boiled acids can't corrode Aloyco "Hastelloy" Valves

The fight against corrosion by hot mineral acid solutions is being won by the Hastelloys.

This family of alloys plays a major role in the production of Aloyco corrosion-resistant valves. And here's why:

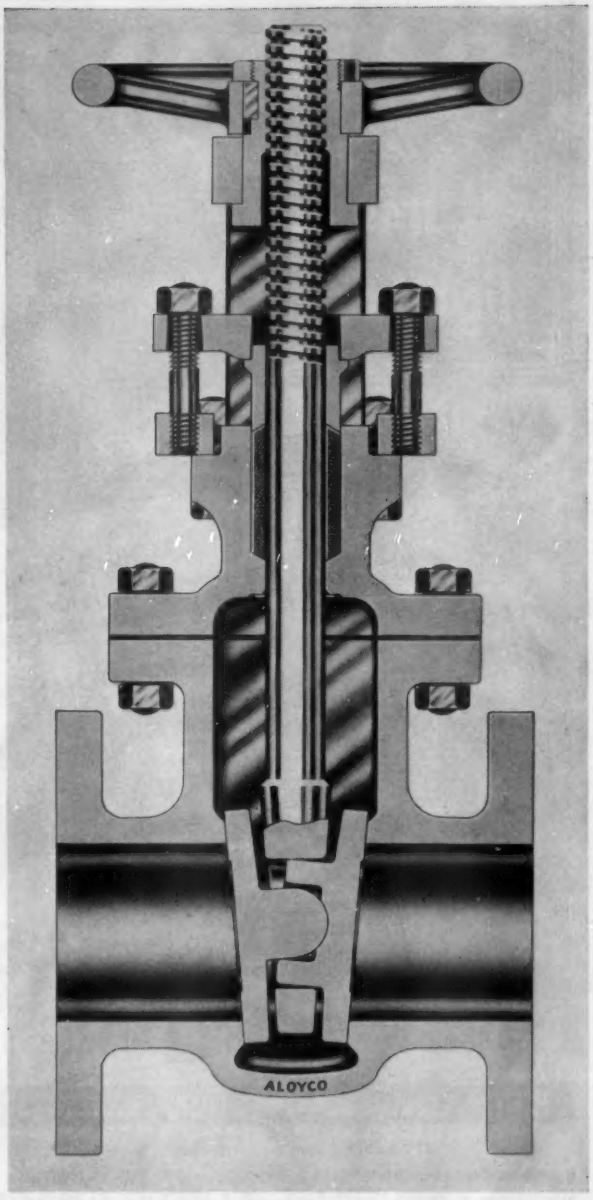
Hastelloy Alloy B is the only available alloy, with the exception of noble metals, that resists hydrochloric acid in all concentrations—even at boiling temperatures. It also withstands corrosion by hot sulfuric acid concentrations where other materials have been found unsatisfactory.

Hastelloy Alloy C at room temperature has good resistance to wet chlorine gas, hypochlorites and other solutions containing chlorine. It is also outstanding for its resistance to secondary spin bath solutions encountered in the rayon industry.

Hastelloy Alloy D has excellent resistance to sulfuric acid at high concentrations and elevated temperatures. It outperforms all other materials in resisting sulfuric acid solutions containing hydrocarbons, coke and tar encountered in oil refineries.

This remarkable Hastelloy family is now available in a wide range of Aloyco valve designs. Cast by induction melting of master heat ingots, Hastelloy valves undergo a special annealing process that imparts better machining qualities . . . assures maximum corrosion resistance. A new bulletin, couponed below, will provide you with complete information.

Write today to: Alloy Steel Products, Inc., Linden, N. J.



Aloyco Hastelloy Valves are suited by composition and a special annealing process to handle hot solutions of mineral acids.

Alloy Steel Products Company, Inc.
1308 West Elizabeth Avenue
Linden, New Jersey
Gentlemen:

Please send me a free copy of your new Bulletin No. 10 on Aloyco Hastelloy valves.

Name_____

Firm_____

Address_____

City_____ **Zone**____ **State**_____

5.15

For more facts circle 649 on Reply Card

RADIANT

Reflector Weatherproof

Lamps cut lighting costs

Here's How

LONGER LIFE

Weatherproof glass resists moisture and temperature changes outdoors and indoors.

LESS MAINTENANCE

Built-in silver reflector stays bright. Not affected by dirt, fumes or corrosion.

HIGHER LIGHT OUTPUT

Greater beam candlepower, directed where required.

Send for Bulletin 83

Shows advantages of standard and high-voltage Radiant Lamps for high bay and protective lighting, Spatterproof Lamps for welding, and Infra-red Lamps.

RADIANT LAMP CORPORATION

311 Jelliff Avenue Newark 8, N. J.

Manufacturers of Lamps from 50 to 10,000 watts for PROJECTION • SPOTLIGHT • FLOODLIGHT • INFRA-RED AERONAUTICAL • MOTION PICTURE PRODUCTION • SPORTS LIGHTING and GENERAL SERVICE

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GRAPHIC SYSTEMS

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need to make such a program practicable? The minimum standards group which could function properly would consist of two men. To support this many standards people would require a maintenance force, excluding janitors, sweepers and watchmen, of 40 to 50 people. However, a smaller organization, under favorable circumstances might justify an application. The number of different trades and the distribution of men between the various trades would be determining factors.

Fuel Change Cuts Costs

(Continued from page 136)

tracted. The conversion was done by an outside firm. Also, the company paid $35 for each of the 14 propane tanks.

The propane is rated at 115 octane; the gasoline formerly used was 80 octane. Propane has so much additional power that it was necessary to adjust the governors on the seven vehicles to prevent speeding. Coughing, sputtering, and prolonged difficulty in starting the vehicles on cold mornings, or after they had been out of service for several hours, has been virtually eliminated.

Occasionally, one of the industrial trucks will run out of fuel on the floor. This used to be a major problem. The vehicle had to be towed to a gasoline pump, located at one end of the building, to be refueled. Usually, this meant tying up two vehicles and two drivers on what amounted to a non-essential job.

The only other way to handle the situation was to bring gasoline from the pump to the stalled vehicle. Inevitably, some fuel spilled on the floor as it was poured into the tractor's fuel tank. Fire extinguishers were handy and there were plenty of no-smoking signs nearby, but company officials couldn't help worrying whenever they thought of the vehicles being refueled on the production floor.

Now, when a tractor runs out of fuel, it is a simple matter to carry a new tank to the spot where the vehicle is stalled. The tanks, which weigh about 30 pounds, can be handled easily by one man. This procedure cuts lost time to a minimum.

Maintenance Study

(Continued from page 130)

increase the unloading rate. At the start, the unloading rate was low enough to be a potential bottleneck in production. While this reason was the more compelling, any gain in the unloading rate would reduce both oper-

Gardner-Denver Maintenance Tools make plant housekeeping easier

Good industrial maintenance often calls for concrete demolition, masonry drilling, heavy lifting, tough digging, firm backfilling — jobs done quickly and easily by the crew that's equipped with these costsaving Gardner-Denver Air Tools —

Write for descriptive bulletin.

The Gardner-Denver WH-125 — puts compressed air where you need it for operating these tools — for cleaning — for paint spraying.

GARDNER-DENVER

THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS FOR CONSTRUCTION, MINING, PETROLEUM AND GENERAL INDUSTRY

Gardner-Denver Company, Quincy, Illinois

In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Avenue, Toronto 16, Ontario

For more facts circle 652 on Reply Card

ating and maintenance costs. Power costs for a pneumatic system are high when compared to a mechanical bucket system, and in this instance a 50-hp motor operated from eight to sixteen hours per day.

Observation of the unloading procedure disclosed several ideas which might increase the unloading rate. We had trouble moving the powder in the hopper car to the unloading pan. As an initial step, a pneumatic car vibrator was obtained to assist the operator in keeping the powder flowing to the outlet hopper. This move added a maintenance item to the picture, but the vibrator is of considerable value although not 100 per cent effective.

We also noted that the system shut down when the blower motor was overloaded. Also a heavy fall of powder would, occasionally, flood into the outlet line, causing a plug, with resultant delay in unloading. These two items were related as the plug condition would cause a blower motor overload, and if the plug did not clear promptly, the motor would kick out. The system is equipped with a vacuum breaker located in the air line to the blower. The vacuum device appeared to be sluggish in operation, and to steady the operation an additional spring-loaded vacuum breaker was installed in parallel with the existing weight-operated vacuum breaker and adjusted to open slightly in advance of the weight device.

Both units were adjusted to open at a point where the motor was just fully loaded. This step virtually eliminated motor kickouts, but did not eliminate the plug condition caused by powder falls.

New Pan Does It!

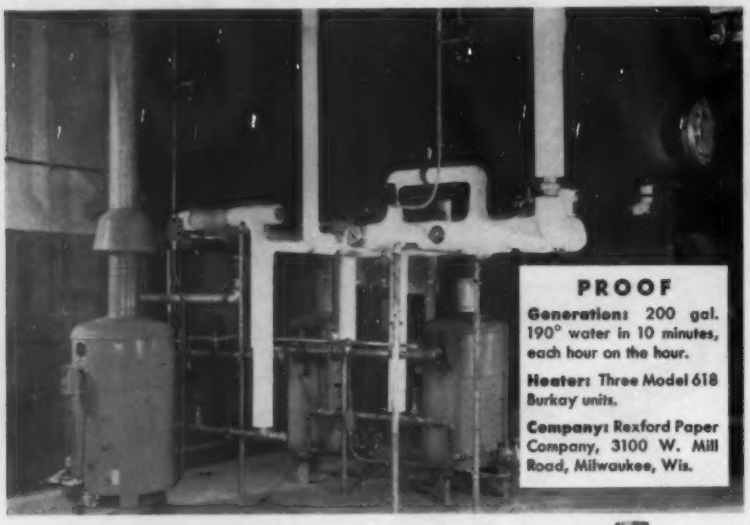
Our attention was next directed to the arrangement of the unloading pan and the avoidance of plugs due to powder falls. After a few trials, a new-style pan was developed as shown in Fig. 5. With the old arrangement, attempts had been made by the operator to keep the car-slide valve partly closed to avoid plugs. Thus, while helping to avoid plugs, this could also reduce the unloading rate. In constructing the pan, the weight was kept low to assist the operator when placing the pan in position. Also, two pans were made so the operator would not lose time in shifting pans from one hopper gate to another.

An examination of Fig. 5 shows that all the air required can enter between the inner and outer ducts. Also, the use of the lower flange serves two purposes. First, the air enters at the upper half annulus causing intimate mixing of the air and powder. Second, the flange at the lower half restricts powder from flowing out onto the ground. The angle iron placed just over the outlet across the upper part of the pan acts as a splitter or diverter, causing powder falls to be deflected from the outlet and avoiding the plugs.

When the new unloading pan was developed, it was also decided that a larger size hose would help increase the unloading rate. So we changed from 4-in. to 5-in. flexible hose. As a section of the unloading pipe line was also 4 in. this, too, altered.

Unloading rate figures before and after the alterations were made showed the rate had been, on the average, doubled from three to six tons per hour.

As in the case of the first "design maintenance" effort on filter bags, the increase in the unloading rate is difficult to evaluate in dollars. The reduction in power costs (by operating only one-half the previous time) is considerable, and goes a long way to pay for the costs of the alterations. As the increase in the unloading rate was accomplished more or less over the same period of time that the work on the bag life was done, there is some inter-relation of the two efforts.


PROOF
Generation: 200 gal. 190° water in 10 minutes, each hour on the hour.
Heater: Three Model 618 Burkay units.
Company: Rexford Paper Company, 3100 W. Mill Road, Milwaukee, Wis.

Here is proof of

Burkay

Water Heating Efficiency

You can rely on Burkay for efficient hot water generation. Located strategically throughout your plant, Burkay hot water *heaters* can provide all the right temperature hot water required in washrooms, cafeterias and for processing needs . . . plus reducing your boiler usage.

As single units or in banks, Burkay can meet specific hot water demands . . . and do so economically . . . without annoying time lag.

Highly efficient heat exchanger, rust-free water, minimum of maintenance makes the Burkay a popular unit among plant managers.

Why not call on your nearest A. O. Smith-Burkay distributor to help you with your hot water problem.

Burkay units are available in sizes ranging from 40,000 to 420,000 BTU per hour. Three Basic Types. Eight models.

Through research ...a better way

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PERMAGLAS DIVISION
KANKAKEE, ILLINOIS

A. O. Smith Corporation, Permaglas Division
Kankakee, Ill., Dept. PE-1055

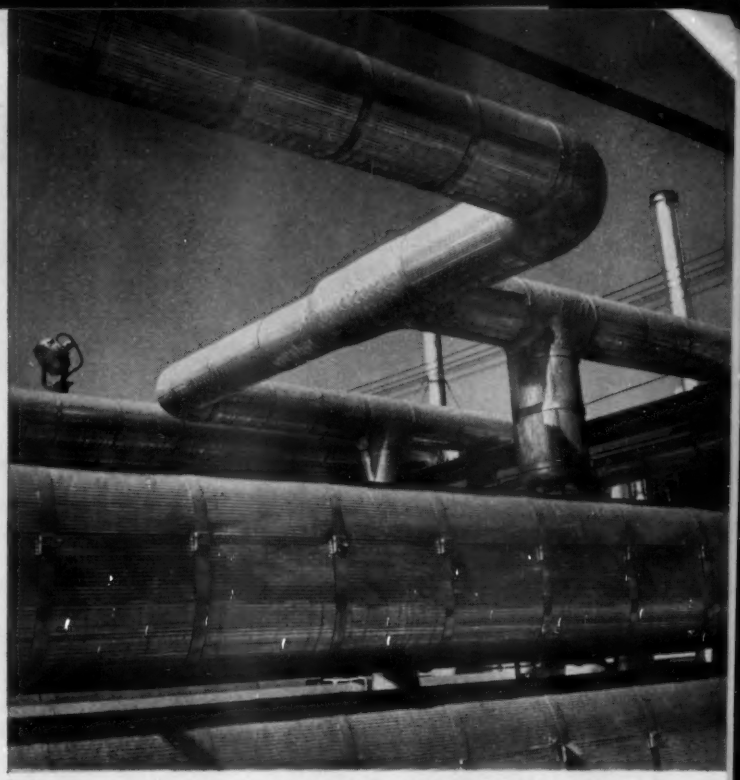
Please send me complete details about Burkay water heaters.

Name.....Title.....
Company.....
Address.....
City.....Zone....State.....

For more facts circle 653 on Reply Card

How Olin Mathieson Uses Childers Jacketing For Insulated Lines

Jacketing problems at new plant ranged from covering tall towers to irregularly-shaped heat exchangers. Read how aluminum jacketing solved these problems.



More than 244,000 square feet of Childers .006" Jacketing and 35,000 square feet of heavy weight Childers Jacketing was used in this new Olin Mathieson plant to weatherproof insulated lines, towers and vessels. Close-up above shows how aluminum jacketing was applied with strapping and seals.

Low first-cost, long life, and easy installation were the big reasons Olin Mathieson Chemical Corporation used Childers Aluminum Jacketing for outdoor insulated lines in their new Brandenburg, Ky., petrochemical plant.

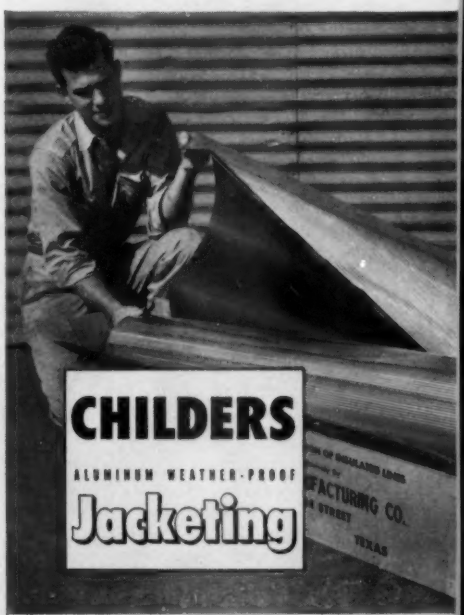
Mathieson used Childers standard weight Jacketing on their insulated lines. Heavier weights of Childers Jacketing were used on high towers and vessels where a stiffer material was needed to support the vertical weight of the jacketing.

Engineers report that Childers Jacketing is inexpensive to apply. It comes in easy-to-handle rolls 4 ft. wide and 100 ft. long. Just pliers and a pocketknife are the only tools needed to apply. And because the jacketing is aluminum it needs no painting . . . stays clean and new looking even after years of service.

Childers Jacketing is easily removable, too. Just remove the strapping and jacketing can be taken off for inspection of the lines. Then same jacketing can easily be put back on the insulated line.

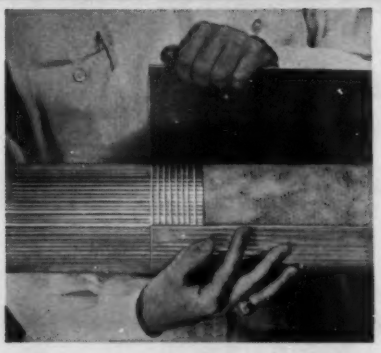
Immediate shipment from our large factory stocks can eliminate costly delays in construction or plant improvement schedules.

Try this low-cost protection in your plant. Write today for engineering data and information. You can order a 400 sq. ft. roll to test on one of your insulated lines. No obligation. Address: Childers Manufacturing Company, Department PLE-6, 3620 West 11th St., Houston, Texas.



Each roll of Childers Jacketing comes individually packed like this in a heavy corrugated carton. Rolls are 4 ft. wide. With moisture barrier attached they are 100 ft. long; without moisture barrier they are 200 ft. long. They are well protected for field storage if kept dry. Individual boxes are light enough for one man to handle. (Adv.)

Only Childers Jacketing Offers *LAP-SEAL*



LAP-SEAL **is a series of eight ribs rolled into the underlapping edge of the jacketing.**

LAP-SEAL **makes more positive weather seal.**

LAP-SEAL **saves labor—2" ribbed edge eliminates measuring for circumferential lap.**

LAP-SEAL **(patent applied for) is an exclusive "plus" available on all Childers Jacketing at no extra cost.**

For more facts circle 654 on Reply Card

Where can you get a sling like this?

7½ ton flywheel being lifted by two ⅝" JalKlamp Choker Slings.

More strength at lower cost— with JalKlamp

Here's the newest way to cut your materials handling costs.

J&L can furnish safer, stronger wire rope slings and terminals *at lower cost* thanks to JalKlamp, the new sleeve for wire rope splicing, exclusive with J&L.

The reason: non-corrosive JalKlamps are made from a special alloy. When hydraulically pressed around the rope, this alloy flows into the spaces between the wires and strands . . . produces a neat, permanent, watertight splice that's stronger than any tucked splice. And, because they're machine made, JalKlamp splices cost less.

JalKlamp slings and terminals are available for all standard wire rope constructions and in diameters ranging from ⅛" through 2", with SpringKore, Plasti-Kore, Fiber Core, and Independent Wire Rope Centers.

Specify JalKlamp slings and terminals and get these features:

1. High Strength
2. Economy
3. Non-Corrosive
4. Water Tight
5. Permanent
6. Neat, Safe — no jagged ends

Jones & Laughlin Steel Corporation
438 Gateway Center,
Pittsburgh 30, Pa.

☐ Please send me a free copy of your JalKlamp booklet.

Name_____

Company_____

Address_____

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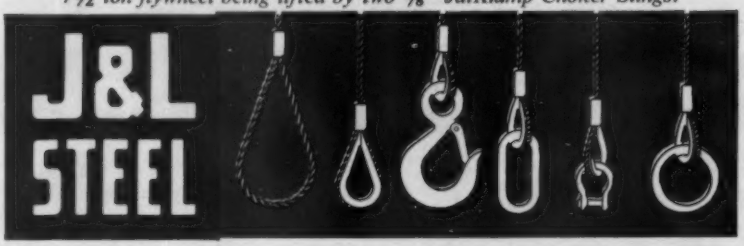

Jones & Laughlin
STEEL CORPORATION — *Pittsburgh*

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OCTOBER, 1955
(This card void after April 30, 1956)

PLANT ENGINEERING

Please have manufacturers send without obligation information or bulletins indicated by numbers circled.

(Please print or typewrite)

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Your Company Name .....

Company Address..... City..... State.....

(Company name must be given. If you prefer delivery at home, also fill below)

Home Address..... City..... State.....

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BULLETINS

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163 Aluminum Alloys—This 6-pp brochure explains general properties, fabricating characteristics, typical applications, and available size ranges of company's commercial aluminum alloys. Also included are alloy designations, weight comparison and temper designation charts. Peter A. Frasse & Co., Inc.

164 Vacuum Melted Metals—Bulletin VM-101, 24-pp, covers the subject of vacuum melted metals and alloys and effects of vacuum melting on properties of various metallic materials, benefits of the process to user of such metals, and fabricating and machining recommendations. It also includes detailed engineering data on two new vacuum melted high temperature alloys. Carboloy Dept., General Electric Co.

165 Specialty Steels—This 32-pp illustrated guide to specialty steels defines characteristics of a broad range of special purpose steels in terms of end use. Briefly summarizes company's specialty product line, covering tool and die steels; stainless steels; silicon and high nickel electrical alloys; special purpose alloy steels; valve, heat-resisting and super alloy steels, tubing and pipe in various analyses and wire specialties. The Carpenter Steel Co.

Among this Month's New Literature of Merit . . .

168 High Vacuum Pumps—Catalog 425, 52 pp, on high vacuum pumps, features both engineering and catalog sections. Profusely illustrated, the book contains installation photos, drawings, performance curves, conversion tables enabling its use as a vacuum engineering reference book. The catalog section of the book presents compound, single-stage simplex and duplex and two-stage mechanical booster high vacuum pumps. Text covers construction details, applications, operation, specifications. Treated in the engineering section are high and low absolute pressure requirements, selection factors, determination of pipe sizes, influence of condensable vapors, other technical aspects. Kinney Mfg. Div., New York Air Brake Co.

169 Scientific, Engineering Data—Issued in commemoration of this company's 75th anniversary is the 115-pp booklet, "Selected Scientific and Engineering Tables and Data." Arranged for easy reference, book contains helpful charts and tables, standard formulas and definitions in the following classifications: chemical and physical, engineering, plastics, bacteriological, leather, psychometric and textile. Available to qualified plant engineers, please state your job title when requesting this. United States Testing Co., Inc.

170 Gear Manual—Complete engineering data on a line of gears and gear products is presented in 76-pp Catalog G-655. Illustrations, diagrams, definitions, tables, charts and explanations regarding all types are included, as well as a simplified method of calculating horsepower ratings. Photos and drawings illustrate design and operation features, specifications list technical data such as dimensions, capacities, standard ratios, efficiencies. Among the types covered are spur gearing, helical gearing, herringbone gearing, spiral gearing, worm gearing, spiral bevel gearing, serol gears, sprockets, splines and others. Philadelphia Gear Works, Inc.

171 Insect Control—Featuring manufacturer's insecticides and insect control equipment, this practical 36-pp booklet provides excellent tips on the control of industrial insects. More than 60 pests are pictured along with specific information on where they are found, identifying features, extent of damage, life stages and cycles, characteristics of existence, and recommended control measures. Ten insecticides are discussed in detail. Atomizers, mistorizers and fogging units are pictured and described as to advantages and applications. West Disinfecting Co.

INSTRUMENTS, CONTROLS

173 Regulator Controls—Specific regulator problems and solutions are treated in 36-pp Bulletin 1094. Describes 16 distinct gas regulation situations in which "special" controls are called for, including both high- and low-pressure regulator arrangements. Consideration of the problems and solutions are presented by use of full pages of text with a facing page of cross-sectional schematic drawings. Meter and Valve Div., Rockwell Mfg. Co.

174 Proximity Meter—Now available is a 28-pp technical and application manual on a precision electronic instrument that measures without touching the specimen. The book is intended to aid in the solution to many problems of precision measurement. Explains operating principle of this proximity meter. Some of the applications described cover the meter's use as a non-contacting micrometer; concentricity gage; surface finish gage; strain gage; torque meter; vibration meter; pressure gage; insulation thickness gage. Fielden Instrument Div., Robertshaw-Fulton Controls Co.

175 Purge Meter—Bulletin 135 describes a new concept in metering small flows of liquids or gases—the Sho-Rate 50 Purge Meter. Complete description of various models and accessories, together with capacity charts and dimension drawings are included. Brooks Rotameter Co.

176 Pneumatic Flow Control—Bulletin 285-M30, 6 pp, describes flow and pressure control in water filtration and waste treatment plants, and in many industrial processes, with a pneumatically actuated device weighing only 15 lb and 16 by 3 in. long. Bulletin contains dimensions and installation and schematic diagrams in addition to useful information on description, operation, and advantages. Builders-Providence, Inc.

177 Pyrometer Service Tips—Bulletin F 7259, 12 pp, offers service tips for pyrometer users—including what to do if instrument is reading erratic . . . temperature curve off . . . reading too high . . . or too low . . . instrument controls erratically. Wheelco Instruments Div., Barber-Colman Co.

178 Switches and Governors—Eight-pp Bulletin 504S outlines advantages of company's line of speed sensitive switches and overspeed governors. Includes dimensional drawings of the overspeed, underspeed, one, two and three switch governors with explanations of the various types of take-off and connectors. Synchro-Start Products, Inc.

179 Air Regulators—Applications, range of operations and outstanding features of this company's air regulators are presented in Form 351. General specifications and parts list are included. Victor Equipment Co.

180 Combustion Control—Regulators for automatic combustion control for oil, gas or coal fired boilers are presented in Bulletins E 102 and E 104. The former describes a self-contained regulator designed especially for combustion control of package boilers. Bulletin 104 describes and illustrates several regulatory instruments—a master regulator, loading transmitter, draft regulators, others. Reliance Instrument Mfg. Corp.

181 Where Time Counts—Described in this brochure is a time recorder and totalizer designed to monitor the operation of any machine, process or system. Discusses advantages offered by this precision instrument. Included with brochure are samples of recorder chart roll tapes, also price lists. Standard Instrument Corp., Div., Heat-Timer Corp.

182 Improved Controller—Bulletin F 5795-2 tells how the Capaciline, a supplementary control device "anticipates" fuel needs of controlled heating equipment and enforces straight line control on the process variable. A typical straight line temperature control application is sketched. Wheelco Instruments Div., Barber-Colman Co.

183 Dissolved Oxygen Analyzer—Bulletin 110-A describes the application of company's Model 2B2B Dissolved Oxygen Analyzer to modern steam generating plant operations. Data covered includes basic principles of measurement, equipment required, flow diagrams and descriptions of typical sampling systems, a flow diagram and detail illustrations of analyzer. Arnold O. Beckman, Inc.

To order these bulletins circle item numbers on the handy Reader Service Cards provided on the facing page.

MATERIALS

185 On Rubber Phenolics—The 32-pp sixth edition of this company's "Design File for Rubber Phenolics" (Publication CDC-237a) contains 25 concise histories and includes some recent rubber-phenolic applications in electrical equipment, appliances, electronics and machinery. Well illustrated, serves as a handbook for evaluation and use of rubber-phenolic molding materials. Stressing design advantages of these materials, booklet opens up new possibilities and offers tested suggestions for upgrading standard products. Chemical Materials Dept., General Electric Co.

186 Rubber Parts Data—This Rubber Engineering Data Book, 12-pp, illustrates and describes company's line of molded and extruded parts of natural and synthetic rubber. A special section is devoted to specifications and relative properties of natural rubber, Buna S, Buna N, neoprene, butyl, thiokil and silicone. Industrial Div., Tyer Rubber Co.

187 Fibers from Redwoods—Four Palco industrial fibers produced from redwood and redwood bark are described in Bulletin F-69-21. Actual size and magnified photos show varied textures. Physical and chemical properties are charted and potential applications outlined. The Pacific Lumber Co.

188 Super Polyethylene—A new type of polyethylene which has greater heat resistance, greater structural stiffness, and better appearance than previous types, is the subject of 16-pp Bulletin C-5-216. Properties of the thermoplastic material are detailed, as well as typical applications. Chemical Div., Koppers Co., Inc.

189 Silicone Rubber—Form 9-102 presents technical data on company's silicone rubber—Silastic. Bulletin is divided into sections detailing properties and performance as affected by extreme temperatures, weathering, compression, chemicals and dielectric service. It is illustrated with charts, tables, graphs and application photos. Dow Corning Corp.

MAGNETIC EQUIPMENT

191 Separation Magnets—Catalog 114 describes manufacturer's Super Magnetomotive rectangular separation magnets. Gives full details on the magnets, including performance data, and is illustrated with photos, drawings and schematic and dimensional diagrams. The Ohio Electric Mfg. Co.

192 Magnetic Pulley—Bulletin 303-C, 16 pp, includes detailed specifications on company's magnetic pulleys and pulley separators. Of particular interest is simplified selection method which makes it easy to select correct size pulley for specific application. Discusses design and construction features, principle of operation, and includes sectional view showing component parts, as well as table of dimensions and weights. Stearns Magnetic, Inc.

OTHER EQUIPMENT

193 Lithium Soap Greases—This product information bulletin details qualities and spe-

BULLETINS

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cifications of company's multi-purpose lithium soap industrial greases. Advantages of multi-purpose grease—such as prevention of lubricant misapplication, simplified maintenance procedures—are discussed, together with performance characteristics of the product. Sinclair Refining Co.

194 Automatic Weldment Cleaning—Bulletin PE-6 covers automatic cleaning of rust, flux, and spatter from welded pieces by abrasive blast cleaning. Includes case history of application in one manufacturing plant, with illustrations of equipment and parts cleaned. American Wheelabrator & Equipment Corp.

195 Screw Data File — A handy pin-up beside the plant engineer's desk is the data file of Mac-it socket screw products. Contains information on seven types of socket screws plus hex-socket keys with regard to dimension standards, standard sizes, physical properties, recommended tightening torque, and suggested applications and uses. Mac-it Screw Div., Strong, Carlisle & Hammond Co.

196 Scale Models—Applications and advantages of company's three-dimensional scale models for industry are outlined in this 8-pp illustrated folder. Points out applications in design, layout and production, employee training, architecture and construction, planning and site development. Knight Models, Inc.

197 Air Filters — Eight-pp Bulletin 117 covers Poro-Stone filters for compressed air and gases. Discusses operation of company's TR filter, in which the movement of the compressed gas is used to achieve initial separation. R. P. Adams Co., Inc.

198 Shaped Tubing — Data Memorandum 17 describes and illustrates shaped tubing and step tapered tubing. Gives full information on analyses available, tool charges, size range, commercial tolerances, lengths, temper. Shapes of mechanical tubing for bushings, punches and machine parts are also illustrated. Superior Tube Co.

199 Corrosion Control — Treatment of industrial equipment to control corrosion cannot be a hit-and-miss proposition, cautions this 6-pp folder. Examples are given of optimum control measures that may avoid costly, unsound treatment procedures, including minor physical or operating changes. Hall Laboratories, Inc.

200 Operation Snow White — This 12-pp booklet describes the lint and dust control process employed in the manufacture of company's line of high reliability miniature and sub-miniature tubes. Numerous photos illustrate ways in which optimum cleanliness during manufacture has resulted in drop in tube inoperatives. General Electric Co.

201 Diesel Hydraulic Locomotive—Eight-pp Bulletin 2006 describes company's Model SH 2225 diesel-hydraulic industrial locomotive. Included in bulletin are tables of characteristics, descriptive information on component parts, a capability table, tractive effort curve. Baldwin-Lima-Hamilton Corp.

Reader Service Cards for ordering bulletins are on pages 235-236. Be sure to include your name, job title, and company, even if you want bulletins mailed to your home address.

202 Fighting Corrosion With Corrosion — Cathodic protection against rust and corrosion is the subject discussed in this illustrated 10-pp bulletin. Describes the corrosion battery, corrective measures, cathodic protection battery, and includes design and application data. Electro Rust-Proofing Corp.

203 Industrial Rubber Products—Specifications and descriptions of 68 rubber hoses for every industrial use are presented in 8-pp Form 3765-R. In addition, bulletin contains data on 9 types of conveyor belts, 7 types of flat power transmission belting, multiple and fractional horsepower V-belts, chute lining, rubber sheet packing and industrial friction materials. Cutaway photos show hose, coupling and belt construction. Thermoid Co.

204 Waste Treatment—A concise discussion of the basic types of equipment available for industrial and municipal waste treatment is included along with photos of typical installations in Bulletin WC-117. The advantages of waste treatment are presented. Graver Water Conditioning Co.

205 Magnetic Pipeline Traps—Bulletin B-605 describes manufacturer's liquid handling Ferrotraps designed to assure product purity, and reduce damage to filters, mixers and pumps by protecting against fine iron and tramp iron in liquid processing equipment. Gives construction information, dimensions and installation instructions for two models. Eriez Mfg. Co.

206 Steel Buildings—Erection photos of this company's tapered rigid frame steel buildings are provided in this 8-pp catalog. Basic feature of these prefabricated buildings is its structural steel system with tapered rigid frames as the principal members. Pictures illustrate some advantages, including superimposed fastening system which speeds up application of covering to framework. The Steelcraft Mfg. Co.

207 Silicones Classified—This bulletin lists company's silicones in liquid and solid forms; in the broad categories of water repellents; oils and oil emulsions; electrical insulating resins; silicone rubber gum stock and compounds; and silicones for anti-spatter, anti-foaming materials. Also covers silicone intermediates for the plant and other industries, as well as silicone monomers available for experimental or commercial development. Linde Air Products Co., Div., Union Carbide and Carbon Corp.

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VALVES, TRAPS, PIPING AND ACCESSORIES

301 **Choosing the Right Valve**—Presenting valve selection as a matter of matching the valve's service characteristics with the service requirements of the job, this practical 20-pp booklet explains and illustrates basic design features of gate, globe and check valves. It tells in non-technical language, how each of these valve types works, and where it is best suited for use. Disc, stem connection, bonnet and bonnet-joint characteristics are also discussed and stem-operation is treated. Crane Co.

302 **For Quick Valve Selection**—Here's a 20-pp catalog digest providing ordering and application information on gate, globe, angle and check valves in bronze, iron, cast and forged steel construction, also valve accessories and parts. Illustrated, includes pressure-temperature chart. The Ohio Injector Co.

303 **Butterfly-Valves** — Construction details, engineering and application data on butterfly valves are provided in three illustrated bulletins. Eight-pp Bulletin 557 covers those of standard heavy-duty construction; Bulletin 558, 8 pp, those of standard medium-duty construction; and Bulletin 559, rubber-lined butterfly valves. W. S. Rockwell Co.

304 **Pressure Reducing Valves**—New 6-pp Bulletin W-3 completely describes G-A cushioned water pressure reducing valves, which automatically reduce an existing high pressure to a predetermined low pressure. The installation, operation, adjustment, servicing, and specifications are fully covered. Golden-Anderson Valve Specialty Co.

305 **Bronze Valves**—Globe and angle bronze valves with rising stems, union bonnets and stainless steel plug type seats and discs are described in this bulletin. Discusses design advantages, gives dimensions. Walworth Co.

306 **Plastic Pipe Valves**—This 6-pp bulletin describes tough, corrosion-resistant Dur-Ace plastic pipe fittings and valves. Gives properties of Dur-Ace and includes table showing resistance to more than a hundred chemicals. Standard sizes and pressures of pipe are given, also sizes, weights, prices on pipe and fittings, diaphragm valves. American Hard Rubber Co.

307 **PVC Valves, Fittings** — Circular 601 describes Luncor all-molded polyvinyl chloride valves and fittings. Stresses corrosion resistance of these valves, lists some industrial fluids they handle. A large cutaway illustration shows design details of the valve. Also included are dimensions. The Lunkenheimer Co.

308 **Valve Maintenance Guide** — "Prevent Valve Failure Before It Starts," is a 28-pp text on valve selection, installation, inspection. Pictures damaged valves, explains how damage could have been prevented, discusses maintenance schedules, inspection jobs, lubrication, pipe line checking, threading, regrinding, disc replacement. Jenkins Bros.

309 **Unions, Check Valves**—Illustrated Catalog 55, 24-pp, describes and provides ordering information on a line of forged steel unions and check valves. Socket-weld, high-speed, orifice, O-ring and other unions are included. Catalog provides service recommendations, dimensions and list prices. Also included is table covering discharge of water to atmosphere. Clayton Mark & Co.

310 **Valve Installation Tips**—Comprehensive instructions on proper way to install company's Line Blind valves are given in this pocket-size 24-pp manual. Concisely written, the booklet is illustrated with cartoon-type drawings. A separate section is devoted to trouble shooting for faulty-installation techniques along with recommended corrective procedures. While dealing primarily with Line Blind valves, this information can be applied also to gate, globe and plug valves. Hamer Oil Tool Co.

311 **Reducing Valve Engineering Data** — Bulletin 962 explains how the contour of a pressure reducing valve contributes to efficiency of performance. Discusses straightline flow, tight closing. A. W. Cash Co.

312 **Industrial Valves**—Condensed Catalog 105, 28-pp, contains data on valves for a wide variety of applications. Includes dimensions and illustrations describing non-return (stop-check) valves, globe and angle stop valves, pressure seal design, angle univalves and small size globe valves designed for chain or extension operation in vertical lines. Also included is company's Mudwonder valve for abrasive fluid application in industry as well as mudlines in the oil field. Edward Valves, Inc.

313 **Hydraulic Control Valves**—Eight new hydraulic control valves with ball detent for position locking are described in 26-pp Section 4 of this company's Catalog 200. Included are six three-position, four-way valves, and two two-position, four- and three-way valves. Dimensional data and typical circuit diagrams are provided. Logansport Machine Co., Inc.

314 **Bronze Valves**—Bulletin 110 points out the advantages of company's "500 Brinnell" bronze globe and angle valves with stainless steel seat and disc. Design features are illustrated and dimensional data is included. Kennedy Valve Mfg. Co.

315 **Corrosion Resistant Valves**—Monel and nickel corrosion-resistant valves are described in Bulletin 9. Discusses corrosion-resistant properties of Monel and nickel, listing specific applications for which each is suited. Gives casting composition of both alloys and describes their mechanical properties. Cross-sectional illustrations of gate, globe and check-type valves are included. Alloy Steel Products Co.

316 **Steam Trap Solutions**—Bulletin F.151 36 pp, is the newest edition of this company's well known booklet, "Solving Steam Trap Problems." Organized for easy reference, this illustrated booklet provides specifications and capacities of steam and float traps, air release valves, pipe line strainers. Tells how to calculate condensation loads and select traps for unit heaters, jacketed kettles, submerged surfaces. Gives pointers on installing and servicing traps. Also included in this edition is information on combination flat and thermostatic traps. The V. D. Anderson Co.

317 **Steam, Air and Gasoline Traps**—Catalog 751, 32 pp, is a recently issued trap ordering book with capacity tables, installation diagrams, and containing charts and formulas for determining proper size trap for specific applications. Covers thermostatic steam traps, expansion steam traps, weight-operated traps for steam, air, gasoline, pressures up to 1500 lb. W. H. Nicholson & Co.

318 **Steam Trap Book**—Catalog J, 44 pp, includes physical data and prices on cast semi-steel and forged steel inverted bucket steam traps, compound steam traps and ball float air and air relief traps; a handbook section explaining how to calculate condensate loads and select traps for all equipment; a maintenance section. Armstrong Machine Works.

319 **Steam Trap Reference Manual** — Bulletin T-1740, 24 pp, tells why and where steam traps should be used; explains desirable trap features. Advantages of company's impulse steam traps are described, their operation illustrated. How to figure trap size and how to size condensate return lines are told and capacity and pipe dimension charts and thermodynamic properties of saturated steam included. Yarnall-Waring Co.

320 **Jacketed Piping, Cocks**—Twelve-pp Bulletin 152 discusses the special advantages, problems and requirements of jacketed piping installations and shows how manufacturer's jacketed piping, cocks, fittings and relief valves are designed to fulfill requirements. Illustrated with photos and drawings, includes specifications. Parks-Cramer Co.

321 **Wrought Iron Pipe** — Technical information required in specifying pipe and tubing is graphically presented in this 52-pp catalog. Tables list size and dimensional data of wrought iron pipe and tubular products, and show dimensions. Data is also provided on wire and sheet metal gages, flow of water in gpm and conversion factors. Tables include size and dimensional data for various types of pipe. Supplementary tables give information on wrought iron physical characteristics and special properties. A. M. Byers Co.

322 **Handbook on Fittings, Flanges**—Catalog wf-1950, 68 pp, offers working information on seamless carbon steel welding fittings and forged steel flanges. Includes dimensional tolerances, thread standards and threading practice; service pressure, ratings, physical and chemical requirements. Grinnell Co., Inc.

323 **Corrosion-Resistant Fittings**—Lower installation costs, greater flexibility, and improved flow conditions are among the advantages claimed for company's line of corrosion-resistant fittings described in this 24-pp bulletin. Includes photos, diagrams, and charts listing dimensions, other specifications. Horace T. Potts Co.

324 **Welded Fittings**—Catalog 3 is a 36-pp ordering and engineering reference book on company's Weldolets for piping services. Gives data on butt-welding and socket welding Weldolets as well as on Thredolets for making threaded outlets. Typical installations are pictured; sizes, weights and prices provided. Also included are installation instructions and a technical section. Bonney Forge & Tool Works.

325 **Expansion Joints** — Rubber expansion joints for relieving strains and stresses in piping, absorbing vibration, eliminating noise are the subject of 8-pp Form AD-137. General advantages of rubber expansion joints are presented, and spool-type, U-type and rectangular-type joints are described as to construction and intended services. Also provided is catalog sheet on all-Teflon joints and Teflon-lined rubber joints. The Garlock Packing Co.

PUMPS, COMPRESSORS

327 **For Hazardous Liquids**—Catalog Section D, 12 pp, presents company's line of Underwriter rotary pumps for hazardous liquids. Both mechanical seal and deep stuffing box models are shown and dimensions and specifications provided. Various mounting arrangements and drives available for these UL approved pumps are also cataloged, and application suggestions are given. Also in this booklet are performance graphs, selection table. Viking Pump Co.

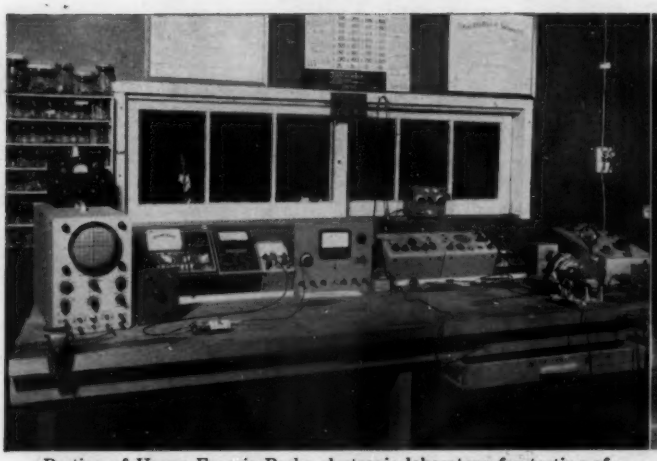
328 **Data on Pumps**—This 12-pp condensed catalog covers turbine-type and centrifugal pumps for a wide range of industrial uses. Gives construction specifications, capacities, application information as well as reference to specific literature on each type. Fully illustrated. Also includes data on mixed flow pumps, sump pumps. Aurora Pump Co.

329 **Condensed Pump Data** — Form 4383-J covers more than 20 types of general service pumps, rotary pumps, sump and drainage pumps, condensate units, self-priming units, stainless steel pumps and high-pressure pumps. In easy-to-find tabular form, each model is pictured along with its characteristics, applications and features. Goulds Pumps, Inc.

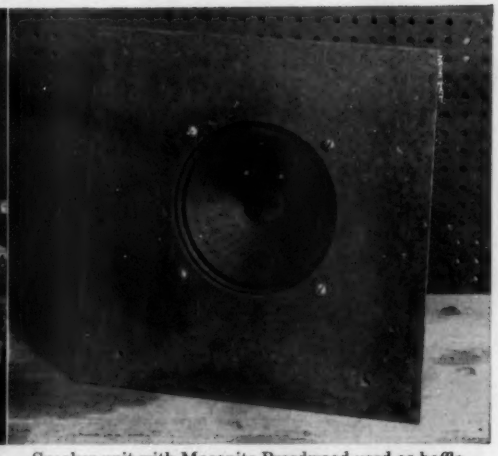
330 **Continuous Flow Pump**—Bulletin 30-C, 8-pp, outlines advantages of company's Moyno pumps which handle a variety of materials—from free-flowing liquids to non-pourable pastes, abrasives, solids. Describes principle of operation, discusses performance, construction, capacities, and includes photos, diagrams and specifications. Robbins & Myers, Inc.

331 **For Abusive Pumping Jobs** — Catalog 4906, 36-pp, covers centrifugal pumps for wide, industrial use and especially adapted to handling ashes, abrasive mixtures, slurries, hot and corrosive liquids. It describes several basic types; a horizontal shaft, single-stage side suction pump; a horizontal shaft, single-stage, rear-entrance automatic priming pump; vertical shaft pumps with standard, overhead and quill bearings for wet pit applications. Nagle Pumps.

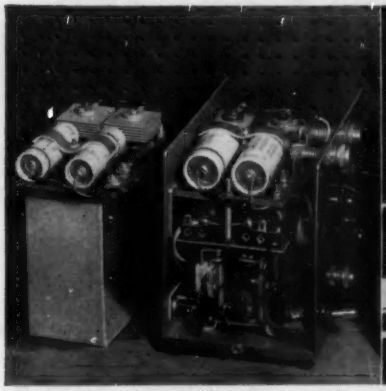
332 **High Vacuum Pumps** — Catalog 400 describes company's mechanical booster high



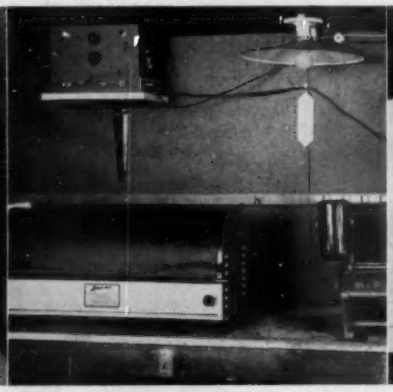
Portion of Henry Francis Parks electronic laboratory for testing of music and speech sounds. Not only the walls and ceiling, but also the front instrument panels are Masonite Presdwood.



Speaker unit with Masonite Presdwood used as baffle board. Without Masonite Presdwood, much of the lower base and baritone musical notes would be lost.



Parks Electrotimer with voltage doubling section shown mounted on Masonite Presdwood at the left—the same section is also shown in an assembled unit.



Portion of the drawing, printing and developing section of Henry Francis Parks Laboratory. The wall, ceiling and front panel of the automatic timer are made of Presdwood.

Henry Francis Parks, head of the laboratory, completing a drawing. The drafting board, walls and ceiling and several of the drafting templates are of Presdwood.

Sound control, too, is easier... costs less with Masonite Presdwood

Testing music and speech sounds from intercoms, phonographs and high fidelity systems is an exacting job, calling for exacting acoustical control.

And an ideal material for those purposes, it seems, is Masonite Presdwood!

"Masonite Presdwood panels are used for covering the walls and ceiling of our laboratory because we have found it to be the best compromise material when music and speech sounds are to be tested," says Henry Francis Parks, head of the Henry Francis Parks Laboratory.

"In addition, Presdwood is easy to handle, to cut and fit, easy and inexpensive to install.

"We also use Presdwood for speaker baffles for its comparative resiliency, ease of handling and machining. Because of its very smooth, yet not highly polished surface, accidents to Presdwood during machining and processing are practically nil."

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Accurate spotting is easy — the push-button control acts fast, and the load and motor brakes are synchronized. The Series "600" 'Load Lifter' is a rugged wire rope type hoist push button controlled. It handles nominal side lifts with complete safety. Other safety factors include upper limit stop, non-fracturing load hook, 24 volts at the push button.

The Series "600" 'Load Lifter' has an aluminum alloy frame; long-wearing, heat-treated alloy steel spur gears with shaved teeth. Anti-friction bearings throughout provide the best in smooth operation. Available in lug, hook, push-type trolley suspensions. Capacities: ½ and 1 ton.

Ask your near-by "Shaw-Box" Distributor for full details or write us for Bulletin 408.

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Builders of "Shaw-Box" and 'Load Lifter' Cranes, 'Budgit' and 'Load Lifter' Hoists and other lifting specialties. Makers of 'Ashcroft' Gauges, 'Hancock' Valves, 'Consolidated' Safety and Relief Valves, 'American' and 'American-Microsen' Industrial Instruments, and Aircraft Products.

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DATA FILE

(Begins on page 240)

vacuum pumps. Points out advantages of two-stage construction, and illustrates characteristics in metallurgical vacuum processing, metallized coating, foundry research and pharmaceutical applications. A cutaway view is included, together with performance curves which show typical pumping speed, other data, horsepower vs. inlet pressure. Kinney Mfg. Div., The New York Air Brake Co.

333 **For On-the-Spot Air** — Eight-pp Form 2302 features company's self-contained Spot-Air portable compressor. Deals with the many tools it will operate, with actual on-the-job illustrations pointing out added advantages of this light-weight compressor on jobs where bigger compressors are not needed. Ingersoll-Rand Co.

334 **Compressors**—Bulletin A72, 36 pp, gives construction, operation information on company's Class WN-114 heavy-duty air compressors. Illustrates seven models of compressor as a single unit for displacement capacities from 1186 to 1948 cfm, twin units furnishing up to 3896 cfm. Joy Mfg. Co.

335 **Portable Compressors**—Twelve-pp Catalog GG-9A pictures 40 models of company's portable type compressors. A quick reference chart shows capacities, engine types, and mountings available. Illustrates such features as: replaceable cylinder sleeves, interchangeable valve parts, aircraft type compressor cylinders, heavy duty industrial type engines, and magneto ignition on all gasoline models. Le Roi Div., Westinghouse Air Brake Co.

336 **Gas-Engine Driven Compressors**—A new two-cycle turbocharged compressor is described in 24-pp Bulletin 134. Stresses economy of installation and operation afforded by this gas-engine driven unit, lists other advantages. Explains how turbocharging saves on fuel and cooling. Design and construction features of this new model are discussed and illustrated in detail. Clark Bros. Co.

PACKINGS

337 **Teflon Products**—Three new bulletins present this company's Teflon packings, gaskets, special parts and stock. Bulletin CP552 describes Chempro lines of Teflon ring packing, Teflon impregnated asbestos packing, V-type packing, and Teflon seal cage—for use with acids and strong chemicals. Bulletin CP553 covers Teflon jacket gaskets, solid ring gaskets, expansion joints and special gaskets. Bulletin CP554 illustrates special parts. Chemical & Power Products, Inc.

338 **Buyer's Guide on Packing**—Twenty-pp Catalog PC-101 brings together all material on company's Palmetto packings and includes data on packing for liquid pistons on inside-packed piston pumps. Greene, Tweed & Co.

MECHANICAL POWER TRANSMISSION

339 **Flexible Couplings** — Condensed Engineering Catalog 51-A contains excellent data on the choice and use of company's flexible metal couplings. Tells advantages of these couplings and discusses design principles. Double-flexing and floating shaft types, light duty couplings and types for special applications are described and pictured in detail. Thomas Flexible Coupling Co.

340 **Roller Chains, Sprockets**—Catalog 754, 64 pp, describes, illustrates a line of roller chain stock sprockets, including minimum Lore sprockets for reboring, also finished bore and Taper-lock bushed sprockets which are ready to use. Tables show speed ratios for sprocket combinations, standard keyways and setscrews. Includes chain selection and application data, installation and lubrication recommendations, chain length calculations, dimensions and price lists for single and multiple strand roller chains. Diamond Chain Co.

341 **Fluid Couplings**—Bulletin 144-D, 14-pp, presents complete installation and performance data on fluid couplings. Illustrated with diagrams and drawings, bulletin shows ease of applying company's fluid couplings on any type industrial equipment, powered by any type electric motor or internal combustion engine from ¾, to 850 hp. Describes standard models providing standard input, output combinations, and standard models in packaged units. Installation hook-ups are given, along with typical applications. Twin Disc Clutch Co.

342 **Sprocket Roller Chain**—Bulletin A-624 24 pp, is compiled to provide plant engineers with all data required for selecting and ordering roller chain and sprockets. Devotes a page to Taper-Lock sprockets for each size of chain from 40 to 100, giving sectional drawing, dimensions, number of teeth, maximum stock bore available, weights, prices and other data. Another page covers Taper Lock bushings; and full information is given on riveted and cotter-type roller chains. Dodge Mfg. Co.

343 **Improved Motor Pulleys**—The complete redesign of this company's standard line of Vari-Speed motor pulleys is described in 28-pp Bulletin V-545. Replete with illustrations, some in full color, this booklet covers construction details, lubrication, controls available. Provides instructions on how to select proper unit, complete rating tables and dimensional diagrams. Also includes data on the Vari-Speed Jr. Reeves Pulley Co.

344 **Shaft Mounted Drives**—Plant Engineers who use machines requiring input speeds between 420 and 10 rpm in the range between ½ and 30 hp, will be interested in 8-pp Bulletin 7101. Contains complete information — design data, selection tables, dimensions, weights, installation photos—on this modern type of standard gear drive designed for high ratios of speed reduction in limited space, with savings in initial and installation costs. The Falk Corp.

345 **Improved V-Belts** — This literature on company's Vulco rope drives explains how this rope with concave sides is designed to fill out to a precise fit in the sheave groove, to provide less wear, more pulley contact and more sure power when needed. The Gates Rubber Co.

ELECTRICAL

347 **Variable Speed Motors**—Sixteen-pp Bulletin 1797, revised, outlines many reasons why variable speed motors can be used to improve production, and it includes illustrations of all types of company's Varidrive motors, as well as their mechanical features, remote controls; etc. U. S. Electrical Motors, Inc.

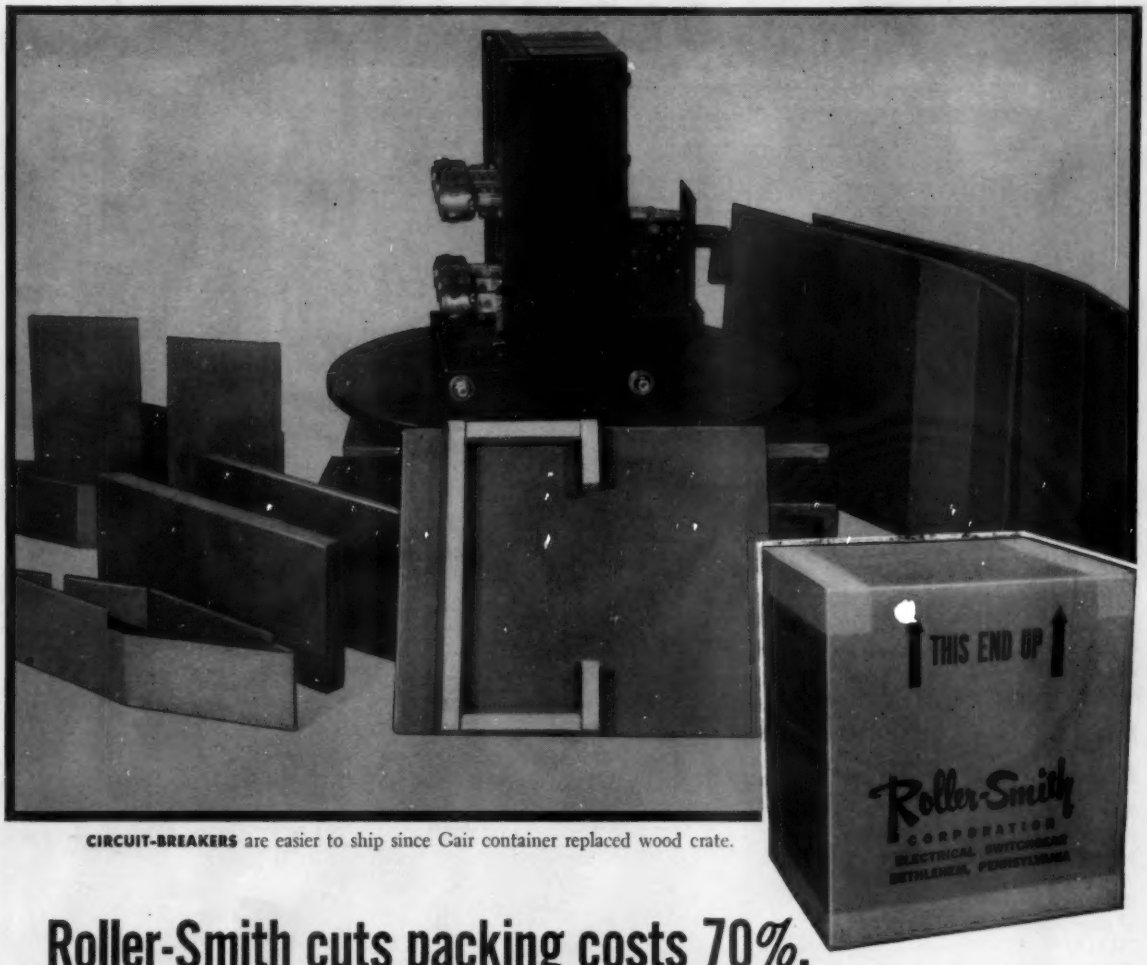
348 **Industrial Electric Motors** — Bulletin N-100 presents technical data on company's Series 100 electric motors. Includes table listing frame sizes, dimensions, schematic drawings showing operation. Howell Electric Motors Co.

349 **Motor Buying Guide** — Bulletin GEC-1026, 28-pp, features company's standard a-c fractional and integral horsepower motors in most general use. Included are general- and definite-purpose, fractional horsepower motors, and fhp gear motors. A section on selection of integral horsepower motors covers horsepower requirements, enclosures, starting current limitations, speeds, motor types, and selection of fuses and circuit breakers. Descriptions and specifications cover single-phase, polyphase, totally enclosed fan cooled, and gear-type integral horsepower motors. Photos, ratings, dimensions, weights, frame numbers, and modifications included. General Electric Co.

The two Reader Service Cards on pages 235-236 are easy to use and need no postage. Just circle the item number of catalogs wanted.

350 **Small Motor Switches**—This 14-pp booklet describes a line of toggle, rotary and push-button switches—popular types designed to meet requirements of manufacturing, plant maintenance. Generously illustrated, this booklet also includes complete rating tables. Cutler-Hammer, Inc.

351 **Toggle Switch**—Catalog 73a, 12 pp, covers 19 precision snap-action toggle assemblies and more than 90 AN and JAN approved designs, including assemblies that will control from 1 to 24 separate electrical circuits. Con-



CIRCUIT-BREAKERS are easier to ship since Gair container replaced wood crate.

Roller-Smith cuts packing costs 70%, shipping weight 27½% with new Gair Container

These percentages are based on actual time studies run by Roller-Smith Corporation, Bethlehem, Pa., on the packing of their heavy circuit breaker.

Cutting lumber, assembling a wooden crate and packing used to take 57 minutes. With the new Gair container the job takes only 17 minutes — a 70% reduction. Material costs also dropped 9¾%, and net shipping weight of the container plummeted 27½%.

What's more, the Gair container has chalked up an excellent record for protection in transit, as well as guarding against loss of accessories often included in shipments. Extra dividends include:

- *advertising* value of Gair's printing
- *dust protection* of Gair's sealed construction
- *elimination of safety hazards* in handling wood
- *reduction* of required storage space

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With the rapid expansion of the field of nuclear science, various needs have developed for ionXchange, particularly in the purification of wastes contaminated by radioactivity. ILLCO-WAY equipment has been designed and built for this and other purposes in several plants employing atomic energy. *For further information on the uses of ILLCO-WAY ionXchange, write . . .*

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DATA FILE

(Begins on page 240)

tains dimensions, operating characteristics, electrical ratings, contact arrangements on each switch, and an illustration of one representative switch from each group of switches. Gives general information on each "family" of switches which are designed for low voltage d-c applications. Micro Switch Div., Minneapolis-Honeywell Regulator Co.

352 FHP Manual Starters—Bulletin 224 is a folder giving the features and ratings of a line of fractional horsepower manual starters. Lists applications for them. Square D Co.

353 Switch Wiring Diagrams—Bulletin 709 is a 36-pp booklet of typical wiring diagrams for across-the-line starting switches. Indexed and arranged for easy use, this booklet serves as a guide to some of the many ways in which this company's manual and magnetic across-the-line starters can be applied. Some of the diagrams incorporate more than one useful feature. Includes key to electrical symbols used. Allen-Bradley Co.

354 The Answers on Wiring—"20 Questions and 20 Answers on Safety m.i. Wiring" describes and illustrates characteristics and advantages of this new wiring system. A complete table of types, sizes, weights and lengths is included. General Cable Corp.

355 Commutator Slip Ring Maintenance—This practical little 40-pp handbook gives procedures and methods for commutator and slip ring maintenance. Generously illustrated with photos and sketches, booklet contains sections devoted to common troubles and their corrections; brushes; general maintenance; and company's products for maintenance of commutators and slip rings. Defines commutator terminology. Ideal Industries, Inc.

356 Power Distribution Cables — The advantages of company's Powerduct cables for flexible bus-drop power distribution are outlined in this illustrated bulletin. Includes tabular data on Duracord and Densheath type cables, as well as directions for normal installation with overhead bus-duct. Anaconda Wire & Cable Co.

357 Power and Control Cables—Sixty-pp Catalog 24 describes typical power and control cable designs and is intended as a guide in selecting proper wire and cable type. Describes insulations, sheaths and coverings, electrostatic shielding, and includes product data on all types listed. Rome Cable Corp.

358 Electrical Conduit—This 8-pp bulletin, Form 646, describes company's heavy-duty, rigid steel electrical conduit, reproducing test data sheets to show how the protected conduit stands up under corrosive attacks of salt spray, sulfuric acid, caustic soda, and exposure to excessive heat. Four-color photos illustrate the effects on this and other conduit after exposure to attacks listed above. National Electric Products Corp.

359 Trolley Busway Systems — Three new bulletins offer real help on electrical installations involving cranes and hoists, assembly and production lines, moving test lines and other moving electric equipment. Bulletin 35 (28 pp) covers 225-500 amp systems; Bulletin 40 (44 pp) 100 amp systems; Bulletin 45 (40 pp) 60 amp systems. Each includes special sections on installation planning and procedure, methods of mounting and equipment descriptions. Feedrail Corp.

360 Handbook on Storage Batteries—This 64-pp booklet of instructions and technical data is the sixth edition of this company's battery service manual. Provides a brief treatise on the theory of the lead-acid battery. Gives detailed instruction on the care and operation of batteries, on maintenance and repairs, and on standard and special parts. Booklet is of special value to plant engineers concerned with storage batteries for cycle service in industrial trucks and materials handling equipment. Gould-National Batteries, Inc.

361 Battery Manual—Battery selection techniques are emphasized in 20-pp Bulletin 210, a revised edition of this manufacturer's manual on storage batteries for stand-by power, emergency lighting and switchgear applications. A discussion of charging equipment and simplified

FOR MORE DETAILED INFORMATION WRITE FOR BULLETIN W-2A and W-10.
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These two automatic cushioned valves will prevent the hammer and shock normally caused by surges in the system.

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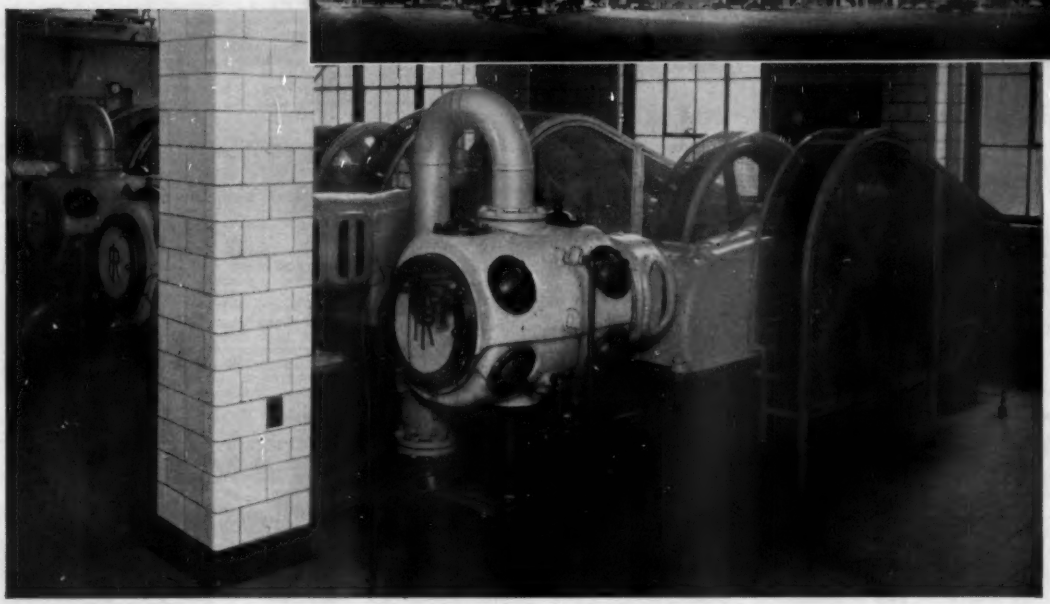

Ingersoll-Rand Class ES Compressors with NL (non-lubricated) cylinders provide all plant and process air at one of America's largest and finest breweries

It takes a lot of air to operate a big, modern brewery — air for instrumentation, weighing, conveying, bottle capping, plant maintenance and movement of beer in preliminary processing. And any air that comes in contact with the beer or its ingredients must be *absolutely free of oil.*

The non-lubricated compressor was pioneered and developed by Ingersoll-Rand Company and it was here at Schaefer's, more than 20 years ago, that one of the first of such units was installed. Self-lubricated dry carbon rings eliminate the need for any oil in the cylinder or packing, keeping the air entirely free from contamination. Three more ES compressors with NL cylinders were installed later, and now all four of them are in daily service as shown in the photo above at the Brooklyn plant of America's oldest lager brewers.

Wherever oil-free compressed air is needed, it pays to specify Ingersoll-Rand NL cylinders. Write or phone for complete details.

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DATA FILE

(Begins on page 240)

battery maintenance procedures is included. Storage battery installation procedures are described and illustrated by photos. Exide Industrial Div., The Electric Storage Battery Co.

LIGHTING, COMMUNICATION

362 **Fluorescent Lighting**—This 24-pp fluorescent lighting guide book is a reference digest on fluorescent products. Gives advantages of this type of lighting; summarizes various lamps and parts, including starter sockets, lampholders. Includes reference chart for lamp performance when interchanged with typical ballasts. Sylvania Electric Products Inc.

363 **Lighting Fixtures**—New Section K of Condulet Catalog 3000 describes components, performance data, and methods of relamping for any of the manufacturer's new EV series explosion-proof and weather resistant lighting fixtures. It contains illustrations showing steps for easiest relamping and installation of this type of fixture. Crouse-Hinds Co.

364 **Industrial Lighting Equipment**—Technical data on company's CFI-10 and CFI-25 industrial lighting equipment with porcelain enamel reflecting surfaces is featured in two new illustrated bulletins. Chief design features are pointed out and dimensional data are given. Day-Brite Lighting, Inc.

365 **Lighting Unit Standards**—A complete compilation of new RLM Specifications is presented in the 48-pp 1955 edition of this authoritative booklet. Covers 46 different types and sizes of incandescent and fluorescent industrial lighting units. In addition, booklet explains reasons for the standards, discusses the basis for the specifications and the objectives of the manufacturers participating in the RLM Inspection and Certification Service. RLM Standards Institute, Inc.

366 **Cable for Lighting**—Sixteen-pp Publication 19-294, of interest to plant engineers concerned with road lighting, offers help in selecting the type of cable best suited to a particular installation. Both series and multiple street lighting are discussed. Specification data is given on cables for direct burial, and for use in conduit, duct or open-air as well as for cables for overhead lines. Splicing and terminating methods for insulations given. Construction Materials Div., General Electric Co.

367 **Precision Lamps**—Bulletin 40 offers application and purchasing information on various types of lamps carried by manufacturer. Flood, infra-red, spatterproof, and weatherproof lamps are discussed. Radiant Lamp Corp.

368 **Fixture Suspension System** — Catalog FF-4, 6 pp, describes a system of fluorescent fixture suspension. Information on parts, suspension and assembly procedure and installation is explained in detail. Also shown are various channels and wire sizes, UL approved for using the system as a surface metal raceway—to suspend and power fluorescent fixture installations. Line drawings and installation photos show how this system requires fewer hanger stems. Unistrut Products Co.

369 **How to Use Sound Signals**—This new 44-pp combination manual, data book and catalog is an excellent reference work on industrial sound signals. Includes a simplified explanation of fundamentals of sound; a glossary of sound and signal terminology; a quick-comparison guide for selecting equipment; suggested steps in choosing a signal installation, and hints for compiling a code signal call system. Benjamin Electric Mfg. Co.

370 **Television Equipment** — Twenty basic applications for "TV Eye" low-cost closed circuit television equipment are described and pictured in Form 3R2335. Folder explains equipment's functions and operation, lists specifications. Radio Corp. of America.

INSTRUMENTS, CONTROLS

371 **Control Centers**—Advantages of control centers and their versatility are discussed in this 28-pp booklet. Illustrated with photos and full-colored drawing, booklet shows 10 typical installations of control centers and explains how this equipment can lower costs. Design and construction features are explained, and three basic NEMA types of construction described. Electrical and mechanical construction details are shown, typical specifications provided. The Clark Controller Co.

372 **Orifice Meters**—Bulletin 1050 Rev. I, 28 pp, shows how manufacturer's orifice meters are made, how they operate. Tables give capacity data, and there are descriptions of manifold arrangements and differential ranges, along with illustration of various parts. Sketches show how meters are used. Rockwell Mfg. Co.

373 **For Liquids Worth Storing**—Bulletin 6405 offers an illustrated discussion of company's self-contained gages for liquid level applications, covering both direct- and remote-reading types, also a dial type hydrostatic gage. Stresses value of measuring stored liquids. Liquidometer Corp.

374 **Portable Brinnell Tester** — A precision instrument for making standard Brinnell hardness tests, which can be carried anywhere or used as a bench tester, is described in this bulletin. Brief text covers its operation, and photos show it in use on many jobs. Advantages of the instrument and its use in making tests are discussed. Andrew King.

375 **Thermal Controls** — Descriptive information and basic technical data on company's Thermoswitch controls are presented in 52-pp Catalog 400. Generously illustrated, this booklet explains basic principle of the controls and why they are sensitive only to heat. Selection and application suggestions are provided, also ordering instructions. Products listed include cartridge, hex-head, block head, flange head, all-purpose, junction box, high temperature and other types of the controls. Fenwal Inc.

376 **Gage Glasses**—Pyrex and Corning gage glasses, their dimensions and tolerances, recommended maximum working pressures, are discussed in Bulletin EG-1. Explains how to cut odd lengths of tubular gage glasses and how

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nuts . . . screws . . . parts
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MARLEY IS TESTING COOLING TOWERS

AND HERE IS THE RECORD

TEST NO.	TYPE OF SERVICE AND LOCATION	SPECIFIED CONDITIONS				TEST RESULT	
		Gallons Per Minute	Hot Water Temp.	Cold Water Temp.	Wet Bulb Temp.	[1]Degrees Cold Water Temp.	[1]Percent Capacity
1	Air Conditioning—West Coast	400	90°	80°	70°	+0.80°	+9.4%
2	Air Conditioning—Gulf Coast	6,500	101.3°	88.5°	80°	—0.40°	—4.3%
3	Chemical Plant—East Coast	18,500	104°	89°	76°	+0.50°	+3.8%
4	Chemical Plant—East Coast (1 of 4 duplicate units)	27,500	103°	88°	76°	—0.40°	—3.2%
5	Power Plant—Southwest	57,500	109.6°	92.6°	78°	—0.04°	—0.4%
6	Petroleum Refinery—Gulf Coast	3,400	115°	80°	70°	+0.90°	+8.5%
7	Power Plant—South Central	83,000	108.1°	90°	76°	—0.04°	—0.4%
8	Power Plant—Mountain States	45,000	105°	83.7°	63°	+0.20°	+0.8%
9	Petroleum Refinery—Gulf Coast	15,000	111°	90°	82.5°	+0.70°	+7.7%
10	Petroleum Refinery—Gulf Coast	36,570	120°	90°	82°	—0.60°	—4.4%
11	Power Plant—Southwest	70,450	102.6°	86°	70°	—0.86°	—4.4%
12	Power Plant—Southwest	70,450	102.6°	86°	70°	—0.51°	—2.7%
13[2]	Power Plant—East Central	13,000	101°	85°	75°	—3.70°	—24.3%
14	Power Plant—Mid-Central	44,000	100°	86°	74°	+0.50°	+4.0%
15	Power Plant—South Central	83,000	108.1°	90°	76°	—0.80°	—4.3%
16	Chemical Plant—South	40,000	103.3°	85°	78°	—0.30°	—3.0%
17	Power Plant—North Central	37,000	100.5°	83°	72°	+1.20°	+9.6%
18	Petroleum Refinery—East Coast	15,570	115°	85°	76°	+1.10°	+9.0%
19	Power Plant—Mountain States	15,570	115°	85°	76°	+1.10°	+9.2%
20	Chemical Plant—Gulf Coast	40,750	123°	90°	80°	—0.16°	—1.2%
21	Chemical Plant—Gulf Coast	11,000	116°	90°	80°	+1.80°	+13.2%
22[3]	Retest of Tower Reported in No. 14	44,000	100°	86°	74°	+0.45°	+4.8%
23[4]	Retest of Tower Reported in No. 11	70,450	102.6°	86°	70°	+0.20°	+1.1%
24[4]	Retest of Tower Reported in No. 12	70,450	102.6°	86°	70°	+0.33°	+1.8%
25	Petroleum Refinery—East Central	6,000	125°	90°	75°	—0.46°	—2.6%
26[5]	Petroleum Refinery—Gulf Coast	10,000	120°	85°	79°	+0.30°	+3.2%
27	Power Plant—Southwest	72,000	112°	92°	78°	+1.05°	+6.6%
28	AEC—East Central (1 of 2 duplicate units)	62,798	132.3°	90°	80°	+0.31°	+3.5%

NOTES: 1) Plus indicates capacity exceeding specified performance; minus denotes deficiency. 2) Tested to determine loss of performance due to extensive settling of basin and resultant misalignment of structure. 3) Retested at higher wet bulb. 4) Retested at contract (higher) horsepower. 5) Tested in accordance with Cooling Tower Institute test procedure (ATP-105 adopted May 1, 1955) and observed by CTI representative.

HERE IS THE RECORD — a consecutive list of ALL acceptance tests conducted by Marley during the 1954-1955 test seasons. All are full-scale tests conducted in strict accordance with specified methods.

Towers tested were of many sizes and capacities, operating under widely varying conditions. Geographically, these tests spanned the entire country and included towers sold since 1950, located at elevations up to 5,000 feet.

HERE IS THE RECORD that offers **more positive assurance of performance satisfaction than any guarantee ever written.** It shows why Marley has the complete confidence to insist that you TEST YOUR TOWER.

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Founder-member of the Cooling Tower Institute

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DIRECT-FIRED UNITS
provide simple, low-cost heat

For large unpartitioned areas in warehouses, factories, auditoriums or supermarkets. THERMOBLOC provides gently circulated warm air that assures customer and employee comfort.

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DATA FILE

(Begins on page 240)

to install them. Technical Products Div., Corning Glass Works.

AIR CONDITIONING AND DUST CONTROL

377 **Improved Dust Filters**—Sixteen-pp Bulletin 528-R gives information on continuous-automatic dust filters available housed or unhoused for use on pressure or vacuum. Explains principle of cleaning the filter cloth with high pressure reverse jet air, and tells where these filters are being used. Provides comparative test data on these and other type filters; discusses industrial dust control service offered and diagrams some installations. Self-adjusting blow rings furnished with these filters are discribed in detail. The Day Co.

378 **Dust Control** — "Engineered Efficiency in Dust Collection and Recovery," 36 pp, discusses industrial dust recovery from standpoint of nuisance abatement, waste avoidance, hazard elimination. Shows effect of variation in particle size, distribution and specific gravity of dust on efficiency of the dust collecting system. Buell Engineering Co., Inc.

379 **Dust Collectors** — Operation, construction, versatility and maintenance of company's unit dust collectors are explained in this bulletin. Includes capacities, sizes. The Kirk & Blum Mfg. Co.

380 **Dust Control, Blast Cleaning**—Bulletin 1210, 24 pp, fully illustrated, describes manufacturer's line of blast cleaning and dust control equipment, accessories. It is indexed according to equipment, type and purpose. Lists three methods of abrasive application. Pangborn Corp.

381 **Air Conditioning Filters**—Bulletin 600, 8 pp, describes company's Stayne-w ventilation and air conditioning filters. Specifications, engineering, performance and installation data covering dry type panel filters for the removal of air-borne impurities given. Dollinger Corp.

382 **On Dust Collection** — Specifications and descriptive details about company's Hydro-Filter are contained in 12-pp Bulletin 55. Tells how unit uses filtering principle to trap dust by impingement on glass spheres; entrapment on bubble surfaces and containment within water droplets. Separating efficiencies, application data, construction and design as well as a description of models and capacity range available and description of laboratory facilities are included. National Dust Collector Corp.

383 **Flexible Hose**—A set of five new bulletins (Nos. 40 through 44) are of interest to plant engineers concerned with the design, installation or purchase of flexible hose for dust and fume control, air conditioning and materials handling. They provide general information, data on installation, application suggestions, technical data and prices on hose, duct and accessories. The Flexaust Co.

SPACE, PROCESS HEATING

384 **Unit Heaters** — Bulletin 7517, 48 pp, presents full information on latest design of this company's Venturafin unit heaters for steam or hot water applications. Gives features of construction, general engineering data, capacity tables. Fully illustrated with photos of horizontal and vertical models, dimensional drawings and piping diagrams, booklet includes tips on the use and selection of unit heaters. American Blower Corp.

385 **Plumbing, Heating Supplies**—Edition G is the current edition of this company's 118-pp general catalog on plumbing and heating repair parts, tools and accessories. Indexed and generously illustrated; gives sizes, intended uses. J. A. Sexauer Mfg. Co., Inc.

386 **Forced Air Space Heaters**—Illustrated Bulletin 523-B, 12-pp, is devoted to a line of forced air heaters for comfort heating, year-round ventilating, tempering make-up air, process drying and heat curing. Explains design

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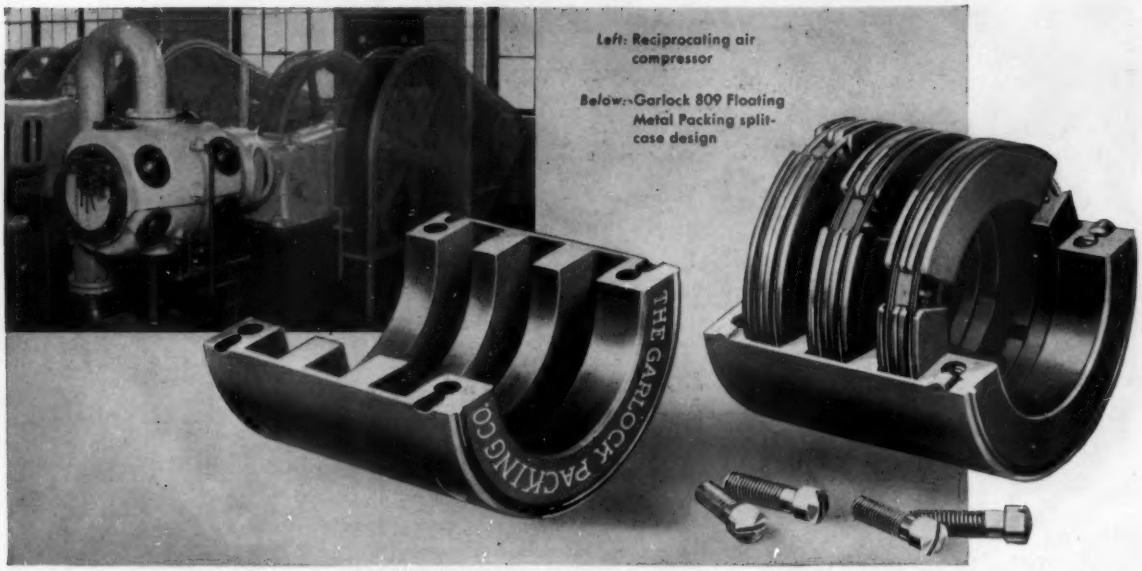
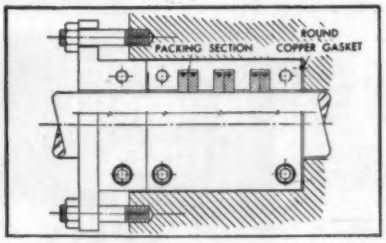


Left: Reciprocating air compressor

Below:—Garlock 809 Floating Metal Packing split-case design

For air compressors, users report GARLOCK SPLIT-CASE METAL PACKINGS have 2 big advantages



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- On steam-driven, variable-speed compressors in a power plant, Garlock split-case metal packings have operated satisfactorily for 15 years without replacement of any parts.

1. **LONG, TROUBLE-FREE LIFE.** Minimum of 7 years with proper lubrication.
2. **CAN BE INSTALLED *WITHOUT* DISCONNECTING THE ROD.** Downtime is reduced to a minimum.

You can eliminate the cost of frequent packing replacements and unnecessary downtime by installing Garlock split-case metal packings on your reciprocating air compressors. Service reports like those at the left, show that these Garlock metal packings have given 15 years *and more* of trouble-free service with a minimum of rod wear.

The minimum packing space for Garlock 809 split-case metal packing is ½". Garlock 805 (also split-case) can be used in smaller packing spaces since it is installed outside the stuffing box.

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Contains information on complete line of Chromalox Electric Heaters, elements, thermostats, contactors and switches. Gives uses, construction information and prices, plus basic heat calculation data and heat loss charts.

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DATA FILE

(Begins on page 240)

efficiency, construction details, operating principles and flexibility of application. Advantages of the heater are detailed. Dravo Corp.

387 Unit Heaters — Catalog 155, 32 pp, presents unit heaters for steam and hot water in vertical and horizontal delivery and power-throw types. Covers design features and provides performance and capacity data. Also provides information on unit heater selection, sound ratings, locating unit heaters, motor wiring and control. Piping and installation suggestions are included as well as typical unit heater specifications. Modine Mfg. Co.

388 Electric Heaters—Bulletin E-1, 8 pp, describes electric unit heaters and heater sections for general industrial heating as well as for specialized use in heating corners of factories, warehouses. Illustrates overhead downward discharge heaters with revolving and stationary discharge outlets, and a heater with horizontal discharge. L. J. Wing Mfg. Co.

389 Gas-Fired Heaters—Form PB1-54 describes and pictures company's Panelbloc heaters that generate infra-red rays that "heat like the sun." Discusses construction and operation of the heaters, and stresses such advantages as no air blasts, downward radiations, low maintenance. Gives specifications for the heaters which operate on any commercial type of gas fuel. Thermobloc Div., Prat-Daniel Corp.

390 Electric Heat, 101 Ways—Principal industrial heating applications and methods are described in "101 Ways to Apply Electric Heat," a 32-pp booklet. Illustrated case histories show how metal-sheathed electric heating units are being used. Physical aspects of installation are detailed along with a discussion of the problem, solution and advantages obtained. To illustrate liquid heating, diagrams and photos show best applications for the elements and heaters. Similar treatment is accorded problems of heating air and gases; melting soft metals and viscous materials; and heating machinery and equipment parts. A section is devoted to far-infrared heating. Edwin L. Wiegand Co.

391 Industrial Ovens — Engineering, manufacturing and installation of processing ovens are described in Bulletin D-53-20, 16 pp. Covers oven types, application to industry, source of heat, selection of heater, control of heat, distribution of heat. Photos show typical oven installations, and a complete modern finishing process is presented. Newcomb-Detroit Co.

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392 Industrial Ovens — Thirteen types of company's Conventioneered ovens, which apply principles of forced convection heating to various industrial processes, are illustrated and described in 12-pp Bulletin 200. These ovens serve foundries, metal finishers, plastics producers. The W. W. Sly Mfg. Co.

BOILERS, GENERATORS

393 Packaged Boilers — This 16-pp illustrated catalog describes manufacturer's new Type VF Package boiler. Following a section of background information is an outline of principal design features of these boilers, which are shop assembled and provide steam capacities from 4000 to 30,000 lb per hour. Space requirements are shown in a table along with specifications. Combustion Engineering, Inc.

394 Automatic Boilers — Bulletin BE-4 describes operation and advantages of Continental automatic boiler's spinning gas technique—a method of obtaining maximum heat transfer with a simplified design. Shows cutaway view of boiler construction; illustrates hinged doors and method of injecting air through static,

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Heaters put Chicago's new skyscraper ahead of schedule!

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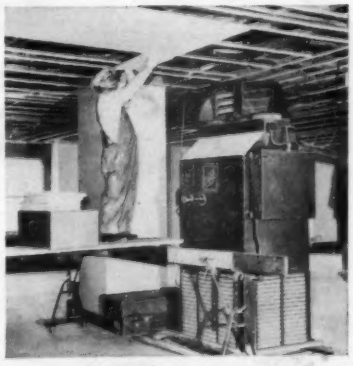
George A. Fuller Company, general contractors, selected sixteen Dravo "Counterflo" Heaters and used two on each floor. Since "Counterflo" Heaters are a complete self-contained heating package, it was a simple matter to place the units in service by merely utilizing a portable fuel tank and "plugging in" to a 220-volt outlet. With this type of operation it was easy to rotate heaters from floor to floor as building activity progressed.

Despite temperatures as low as 15 degrees below, and icy winds up to 50 miles per hour, each Dravo Heater blanketed an area of more than 40,000 square feet with warm air. Workmen handled their job in comfort, unimpeded by the need for heavy clothing. Results? Minimum time off for colds and cold weather ailments, ahead of schedule on construction, earlier-than-planned occupancy. These heaters provided further benefits in that drying of plaster, cement and paint was also accelerated.

This rather unique application points out another of the many benefits that make Dravo Heaters your best heating investment today. Now, in addition to quality construction and top operating efficiency, Dravo "Counterflo" Heaters carry a fully bonded guarantee on all vital parts for 10 years! Such features make Dravo Heaters today's best *and most economical* heating buy! You can get complete details today by using the coupon below.



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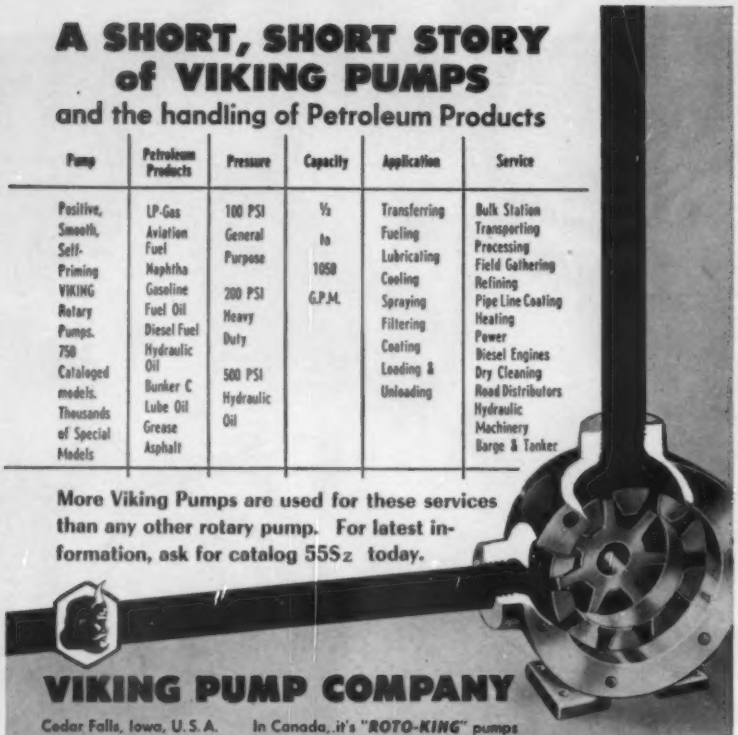

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Dynamically balanced rotors, precision ground shafts, superior bearings, assure a smooth flow of power from a BROOK. Built to resist temperature extremes, moisture, oil and dust. NEMA specifications or better. From 1 h.p. to 350 h.p.

FAST DELIVERY OF ALL POPULAR MODELS!

Brook motors are available from warehouses at Chicago, Jacksonville, Fla., Jersey City, N. J., Houston, Los Angeles, San Francisco, Seattle, Savannah, Ga., and other major distributing points.

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DATA FILE

(Begins on page 240)

turbine-like vanes into burner. Boiler Engineering & Supply Co., Inc.

395 **Water Tube-Steam Generation**—Bulletin SB-51, 16 pp, discusses features of Keystone two-drum water tube steam generator for delivery of low cost steam. Cites advantages of conservative boiler rating (full five sq ft of heating surface for each developed horsepower), automatic controls, easy installation, fast steaming qualities, compact size. Gives specifications on all materials furnished, includes accessories. Erie City Iron Works.

WATER CONDITIONING

396 **Testing Equipment**—Designed for use as a guide in the selection of water testing equipment, this 12-pp bulletin describes complete line of titration stands and tests for hardness, alkalinity, chloride, sulfide, etc.: cabinets and test set for similar tests; Conducto Bridge for determination of specific conductance of water solutions, colorimetric comparators; and the photometer. W. H. & L. D. Betz.

397 **Handbook on Demineralizing**—Comprehensive 40-pp Bulletin 5800-B compares various methods of water treatment, indicating the comparison between demineralizers and evaporators. It discusses the characteristics of the various types of available cation and anion exchange materials and offers data on operating costs of demineralizing. It tells when to use 2-bed, 3-bed, 4-bed, mixed or mono-bed demineralizers. It also indicates when decarbonators or vacuum deaerators are required. The bulletin is replete with typical flow diagrams, photos of installations. Cochrane Corp.

398 **Chemical Control and Testing** — The need for intelligent chemical control and testing to assure the success of a water conditioning program is described in this 6-pp pocket-sized folder. Emphasizes need for explicit control limits and chemical tests to show that these limits are being met, and the proper technical skill required to prescribe these limits. Hall Laboratories, Inc.

399 **Feedwater Treating**—Bulletin 1855, 30 pp, features manufacturer's hot process Accelerator for treatment of boiler feedwater, illustrating and explaining its operation and advantages, optional equipment. Contains excellent discussion of necessity for treatment of makeup water, selection of proper equipment. Also covers the limitations of hot process softening. Infilco Inc.

400 **For Industrial Water Softening**—Greensand, zeolite and resinous exchange water softeners are described in 8-pp Form S-105. Discusses features and applications of each of these basic types and illustrates some installations. Includes capacity data and general specifications. Also describes and pictures controls for water softeners, pressure filters and deionizers. Illinois Water Treatment Co.

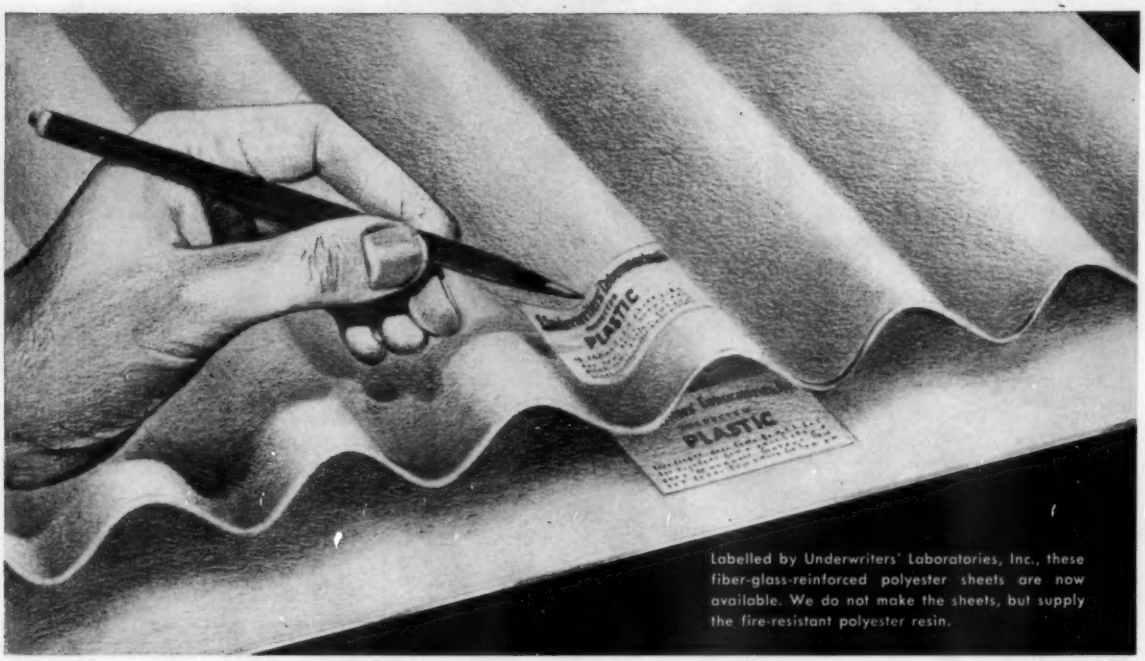
MATERIALS HANDLING

401 **Overhead Handling Equipment**—Booklet 2008-K, 12 pp, is the current edition of this company's engineering and application data booklet covering overhead materials handling equipment. Describes and illustrates track drives, cranes, electrification, buckets, grabs. Cleveland Tramrail Div., The Cleveland Crane & Engineering Co.

402 **Manual on Electric Hoists** — Catalog H-46, 40 pp, covers monorail and stationary hoists and car pulleys. Explains fundamental types of grabs, methods of hanging I-beams, types of hoist suspension, controls. American Engineering Co.

403 **Cranes for Big Jobs**—A new 1½-yard shovel, 35-ton crane is described in this 6-pp catalog. Action pictures of the machine in quarries and gravel plants are included, also specifications. American Hoist & Derrick Co.

404 **Electric Hoist Manual**—Catalog 215-B offers 38 pp of engineering, application and ordering information on company's Load Lifter



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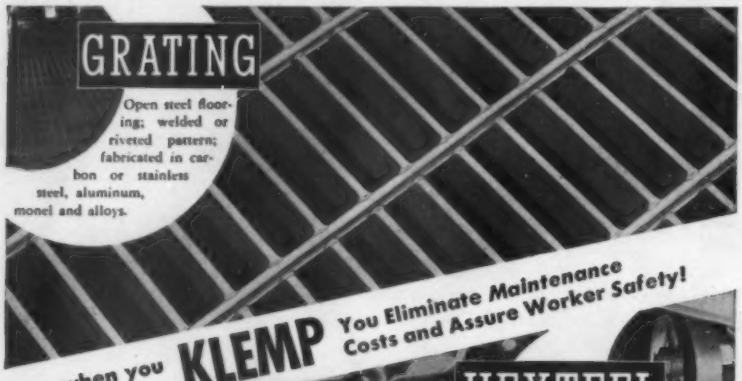
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DATA FILE

(Begins on page 240)

electric hoists. Presents hoists with hand operated trolleys and with power travel, hoists with lug suspension, hook suspension and push-type trolleys, and with hand-geared trolleys, hoists. Manning, Maxwell & Moore, Inc.

405 **Transit Crane**—Twelve-pp Bulletin 15-B-TC-1 describes a transit crane of 15-ton capacity. Illustrated by job application photos and closeups of mechanical features, the booklet includes a list of specifications and working ranges, plus brief, easy-to-read description of the machines, advantages. Bucyrus-Erie Co.

406 **Electric Hoists**—Twelve-pp Bulletin DH 133B describes Speedway electric hoists of 500- to 4000-lb capacities. Fully illustrates and explains design features and gives details on suspensions and conductor systems. Clearance data, specifications included. Wright Hoist Div., American Chain & Cable Co., Inc.

407 **Hydraulic Lifters** — Standard Products Bulletin 54, 12 pp, features new Worklifters portable, battery-operated, hydraulic lifters available in a variety of special purpose designs, in a 1000 lb capacity, and with lifts up to 80 in. Also describes company's Shoplifters with both hand powered and electric hoisting units. Economy Engineering Co.

408 **For Hopper Economy**—"In Dollars and Sense" explains long run economy of company's self-dumping hoppers showing how they operate and telling how they fit particular plant requirements. Illustrated with photos, gives dimensions, weight of a standard 1-yd model. Roura Iron Works.

409 **Conveyor and Elevator Belting Tips**—This 32-pp manual on installation, maintenance and care of conveyor and elevator belting, uses photos and drawings to show ways to improve belt service and lengthen belt life. Includes a discussion of belt design, covers, reinforcements and grades. Repair methods, splicing, and fastenings are also covered, and there's a table listing common conveyor belt maintenance problems. The B. F. Goodrich Co.

410 **Conveyor Trolleys** — A new line of ball bearing trolleys for overhead conveyors is covered in 20-pp Book 2536. Contains specification data for the selection of new trolleys, or of replacement trolleys for existing installations. Describes many features resulting in low operating and maintenance cost. Link-Belt Co.

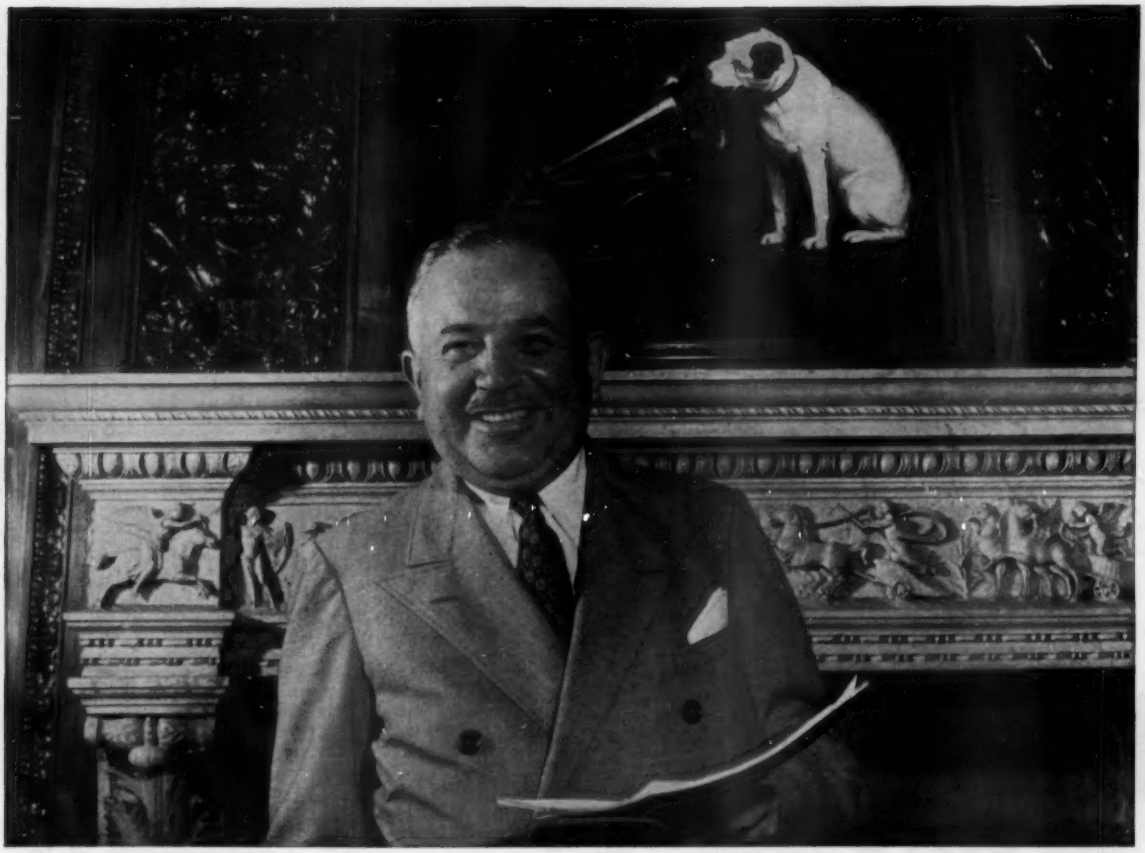
411 **Metal Conveyor Belts** — This 24-pp booklet is an illustrated guide to selection of metal conveyor belts. Presents both conventional and balanced spiral weave belts; covers raised edge and flight constructions, chain edge construction, high temperature belts, wire conveyor aprons. Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp.

412 **Bulk Conveyors** — Twelve-pp Bulletin 455 describes and illustrates bulk conveyors for handling coal, ashes, sand, gravel, stone, chips, aggregate, logs. Photos show these conveyors in a wide range of industries. Drive and take-up units and other components are illustrated in detail. Jervis B. Webb Co.

413 **Conveyor Belting** — Folder 54-3, contains a capsule description of construction, types of treated stitched canvas belting for all conveying and elevating applications. Describes company's general conveyor and elevator belt, oil- and acid-resisting belts to handle hot materials to 600 F. Imperial Belting Co.

414 **Engineered Conveyor Systems**—Catalog 853, 32 pp, illustrates conveyor systems in use in a wide range of industries, showing how they suit handling requirements involved. Roller, wheel, belt, chain, overhead trolley and elevating conveyors are included, also spirals, portable power conveyors, ball transfers and special equipment. Mathews Conveyor Co.

415 **Pneumatic Tube System**—This booklet describes a prefabricated pneumatic tube system, suggests a variety of arrangements for installing the equipment in any type of building, and lists components furnished in the "kit." Also provides instructions for laying out and installing the double-tube system, including plan and side-view drawings. Lamson Corp.



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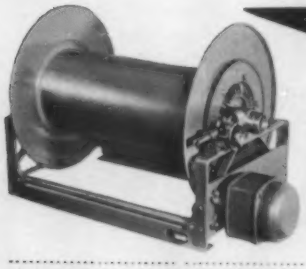

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DATA FILE

(Begins on page 240)

MAGNETIC EQUIPMENT

417 **Lifting Magnets** — Eight-pp Bulletin 35-C illustrates and describes company's permanent magnetic separation and transmission equipment. Provides detailed specifications and application information on circular and rectangular lifting magnets and includes cutaway diagrams illustrating construction. Stearns Magnetic, Inc.

418 **Magnetic Selection Guide** — Twelve-pp illustrated Catalog C-5000-B, describing manufacturer's entire line of magnetic separators and lighting magnets, serves as handy guide to selection. Dings Magnetic Separator Co.

CONSTRUCTION

420 **Aluminum in Architecture**—This 32-pp booklet provides information on use of aluminum, and of special interest is a discussion on architectural colors for aluminum exterior surfaces. Also describes basic types of aluminum finishes—satin, sandblast, bright, and "as fabricated." There are drawings and details of copings and gravel stops; curtain wall products, including facings, panel assemblies and wall units; industrial roofing and siding, weatherside and underside fasteners; trim and molding; sheet, plate, foil, pipe, rod and bar stocks; and structural shapes. An alloy section lists mechanical properties of applicable alloys. Aluminum Co. of America.

421 **For Stairway Construction**—This 12-pp illustrated booklet describes the use of this company's Junior channels in stairway construction. Provides specifications and shows some of the buildings in which the channels have been used as stair stringers. Tables give size and weights, and show allowable loads. Jones & Laughlin Steel Corp.

422 **Basic Roofing Information**—"What You Should Know About Your Roof" is a 40-pp clearly illustrated booklet which tells what makes a roof fail, how to recognize signs of roof deterioration, what to do to keep a roof in good conditioin. Discusses recommended roofing practices, essentials of a good re-roofing job, also special features of company's roofing materials. Johns-Manville.

423 **Metal Grating Handbook** — Sixteen-pp Form 500 is data and specification manual covering all types of grating, open steel floor armor, stair treads, vessel liners, decking and drain grates. Contains safe load tables for basic types of gratings, panel width constant charts, tables on standard widths and types of steel treads, types of anchors used for grating. Klemp Metal Grating Corp.

424 **Steel Floor Plate**—Skid resistance and other advantages of multigrip rolled steel floor plate are stressed in this illustrated bulletin. Also gives dimensions, weights, data on allow-

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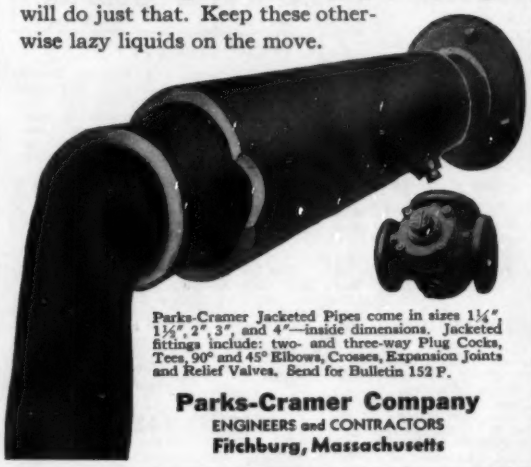

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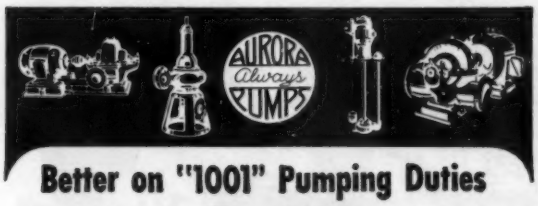

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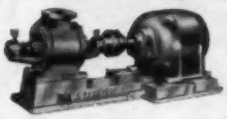

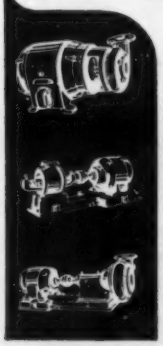

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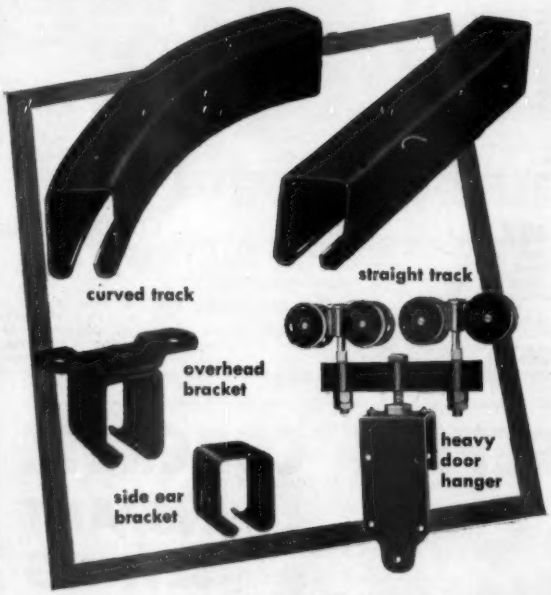

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DATA FILE

(Begins on page 240)

able loads. Typical uses of the floor plate are pictured. United States Steel Corp.

425 **Serrated Grating, Treads**—Bulletin RR-255-A, 8 pp, describes and illustrates open steel floor grating and stair treads with serrated surface for greater safety. Presents four types and gives detailed selection information to aid in choosing proper grating for load-span conditions. A. O. Smith Corp.

426 **Steel Grating and Treads**—Bulletin 2486, 16-pp, describes types, sizes and load characteristics of company's line of electroforged steel and interlocked aluminum grating and treads. Points out advantages in design and construction resulting in greater safety, pictures applications, and includes specifications, photos and diagrams. Blaw-Knox Co.

427 **How to Use Presdwood**—This 32-pp booklet is filled with design and construction data on Presdwood. Although much of the material presented deals with use of Presdwood in homes, the book offers suggestions of value in industrial construction and remodeling. Sections of this practical handbook cover product data, working, application information for both interior and exterior use, and specifications. Includes instructions on proper conditioning, use of adhesives, types of bends finishing, interior joints, fastenings. A table shows properties, sizes available and intended applications. Masonite Corp.

428 **Sound Absorbing Walls**—The advantages of Soundex walls and partitions are outlined in this 8-pp illustrated booklet. Includes photos, construction drawings, full specifications. GR Products Inc.

429 **Panel Wall Construction**—The advantages of company's M-Type Q-Panel walls are outlined in 12-pp Bulletin Q-35-55. Includes installation photos, diagrams, specifications, as well as drawings pointing out structural details. H. H. Robertson Co.

430 **Heat Absorbing Glass**—This 16-pp catalog describes Coolite, a glass designed to trap and absorb much of the sun's heat and to filter out annoying glare. Discusses types and thicknesses, gives light transmission data. Pictures many industrial installations and shows how conditioned natural illumination helps reduce operating costs. Mississippi Glass Co.

431 **Mobile Fire Walls**—This bulletin points out the advantage of company's Mobil fire walls. Describes three of the products designed for stopping the spread of fire within a building; fire doors, fire partitions, and non-combustible interior partitions, and presents test requirements. Virginia Metal Products Corp.

432 **Translucent Structural Panels**—Bulletin 533, 12 pp, describes Resolite, a translucent structural material, corrugated or flat, molded of thermosetting polyester resins reinforced with woven glass fibers. Illustrates use of Resolite in partitioning, skylighting and decorating installations. Provides standard sheet specifications, general information on colors, weights, light transmission and thicknesses. Resolite Corp.

433 **Non-Slip Flooring**—Algrip, an abrasive rolled steel floor plate described as non-slip even on steep inclines, is the subject of Booklet A-5, 8 pp. Discusses safety features; gives fabricating data. Alan Wood Steel Co.

CHAIN SLINGS, WIRE ROPE

435 **To Keep Wire Rope at Work**—Form 3547 is an 82-pp handbook titled: "Here's How to Keep Your Wire Rope Working," and is filled with practical tips on care and use of wire rope. Tells how wire rope is constructed, what types are suited to various jobs, how to install it. Covers such subjects as abrasion, lubrication, avoiding kinks, alignment of sheaves, winding on drums, bending fatigue, wire breaks, when to discard a wire rope. Wire Rope Div., American Chain & Cable Co., Inc.

436 **Wire Rope Assemblies**—Catalog 5201, 22-pp, describes company's wire rope assemblies, used for operating controls, as a part of machinery and equipment, or for slings and hoists. Gives general applications for various types of wire rope assemblies, and includes specifications, ordering details. Macwhyte Co.

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437 **Sling Handbook and Riggers Manual**—In the sling handbook section of this 48-pp book, 11 sling types are illustrated and their dimensions, weights and safe working loads given. Illustrations of sling uses accompany factual data. Also pictured and detailed are sling fittings. Information on care of slings, data on braided wire fabric and directions on splicing braided wire sling fabric included. The riggers manual gives detailed instruction on splicing, and includes data on efficiencies of wire rope attachments. Union Wire Rope Co.

438 **Sling Chain Handbook**—Illustrated Data Book 100, 32-pp presents "how to do it" information on sling chains—from ordering to care, use and inspection. Contains diagrams, charts and tables on standard and special styles of sling chains and attachments, and their sizes, weights, and working load limits under many conditions. Columbus McKinnon Chain Corp.

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439 **Building Maintenance** — Handbook 7 offers 64 pp of information on floor surfacing,

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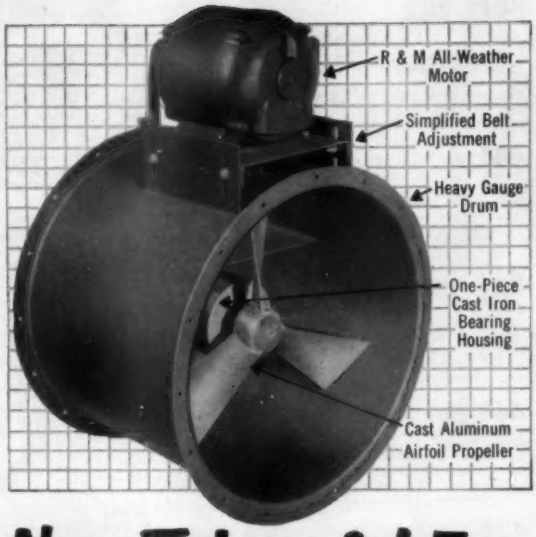
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4. Special high-strength, cast aluminum-alloy propeller . . . higher efficiency and greater corrosion resistance.

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Man Cooler | Direct Drive | Sky-Blast | Vaneaxial | Extended Shaft

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DATA FILE

(Begins on page 240)

leak stoppers, external wall sealants, roadpatching, roofing materials. Includes instruction for applying them. Flexrock Co.

441 For Fast Floor Repairing—This illustrated bulletin covers Kwik-Roc, a fast and tough hardening material for repairing holes and cracks in concrete floors. Tells how to prepare surfaces for Kwic-Roc, how to mix, place, and store it. Includes service recommendations. A. C. Horn Co., Inc.

442 Better Floor Care — This illustrated folder describes products designed to aid efficient floor care. Lists combination scrubber-vac machines, conventional scrubbing-polishing machines, steel-wool pads, applicators, vacuum cleaners, mop trucks and other mopping equipment. Included are waxes, sealers, and cleansers. Finnell Systems, Inc.

443 Cleaning Problem Solutions—Illustrated Bulletin 154, 12 pp, presents information on a wide range of cleaning methods and shows equipment available. Special emphasis is placed on the stationary vacuum cleaning system and its long-run economy in many installations. The Spencer Turbine Co.

444 Insulation Coating — This 32-pp illustrated handbook, Form L-17, presents the advantages of company's NoDrip insulation coating for preventing condensation drip from metal, concrete, brick, wood, plaster or composition surfaces. Lists applications and describes methods of applying. Contains tabulated data on quantity required to cover various size tanks and pipe and data on effect of different humidities. J. W. Mortell Co.

445 Protective Paints — Details on a rubber-base paint formulated to afford increased protection against corrosion from acids and alkalis and especially applicable for use on concrete, are provided in this literature. These finishes are also suggested for wood and metal. Cellulose Products Dept., Hercules Powder Co.

447 Guide to Rust Prevention—The 24-pp 1954 edition of this company's general catalog provides a treatise on rust prevention. Features 94 color chips of manufacturer's products and includes instructions for surface preparation and application of primers, short- and long-oil types, machinery and implement finishes, chemical and heat resistant types, sealers, oil field finishes, thinning oils and floor and masonry coatings. Presents a restful color group of finishes for interiors. Rust-Oleum Corp.

448 Hot-Dip Galvanizing—How hot-dip galvanizing is prolonging life of industrial equipment is stressed in this 16-pp booklet. Photos, showing galvanized equipment in use accompany brief text explaining how this process of covering iron and steel with a protective coating of zinc serves to prevent rust. The galvanizing procedure is explained and illustrated. Coating comparison charts show how hot-dip galvanizing compares with other types of coatings as to rust resistance, dimension limits, shock resistance, initial and maintenance costs. American Hot-Dip Galvanizers Assn., Inc.

449 Industrial Vacuum Cleaner—Advantages of using company's floor-type vacuum for industrial cleaning jobs are stressed in this illustrated bulletin. Describes operation, points out typical applications, and includes dimensions and specifications. Hardling Devices Co., Inc.

450 Blower-Suction Cleaner — Data on a portable combination blower suction cleaner for cleaning machinery motors, stock bins are offered. Describes models available, attachments for many cleaning jobs. Clements Mfg. Co.

LUBRICANTS, LUBRICATION

452 Automatic Lubrication — Sixteen-pp Catalog L-52 describes force feed lubricators for all types of machinery. Illustrated, gives full design and construction details on company's open and enclosed type lubricators, available in capacities from 2 to 32 units, 1 to 24 feeds per minute. Hills-McCanna Co.

454 Proper Lubrication — Presenting proper lubrication as the life blood of all machinery, 36-pp Lubriplate Data Book 54-1 is a helpful treatise on modern lubrication practice. Gives product data on both oil type lubricants and greases and discusses choice of lubricants for use in applications involving heavy loads, high speeds, extreme temperatures, water conditions and other conditions. Provides tables of specific recommendations for various classes of equipment used in chemical processing, metal-working, other industries. Lubriplate Div., Fiske Brothers Refining Co.

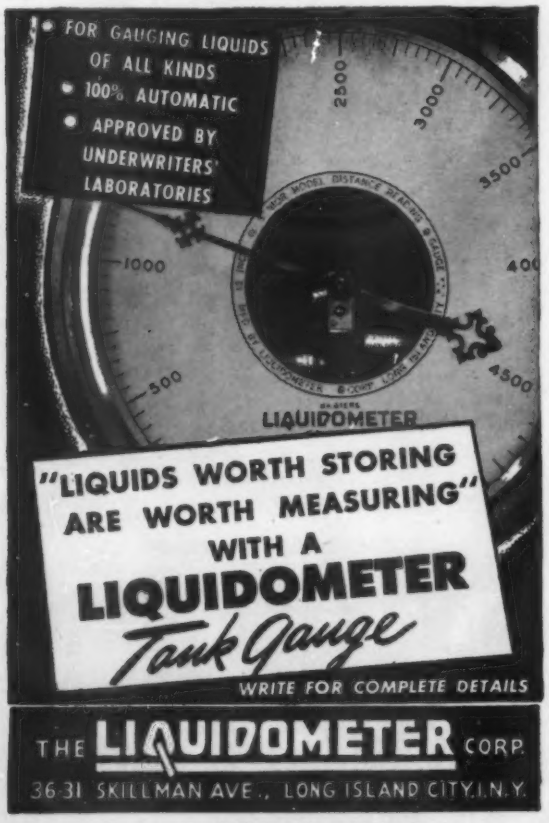
455 Motor Lubrication Tips—"To Grease or Not to Grease" is an illustrated bulletin on lubrication of ball bearing motors. Gives general information on lubricants and lubricating agents. Discusses importance of lubrication to bearing life. Also covers choice of lubricant and procedure. Wagner Electric Corp.

TOOLS, WELDING AND MACHINE SHOP EQUIPMENT

456 Data for the Shop—"Fluids and Facts for Metal Working" is a pocket-size booklet of about 44 pp. A section on metal working fluids covers their function and selection, preparation and use of soluble oils and paste compounds, and prevention of dermatitis. A section on metal working facts gives conversion tables, steel numbering systems, machinability ratings of metals, drill grinding charts, twist drill sizes and other data. Standard Oil Co. (Ind.)

457 Pipe Tool Ordering Guide — Catalog 2-51, 8 pp covers company's line of threaders, cutters, vises, dies, tongs and wrenches; gives prices. Armstrong Bros. Tool Co.

458 Where to Use Your Stud Driver — Twenty-pp pocket-size Form 955 describes and pictures applications of studs, using company's Model 450 stud driver. Provides some operating hints and safety precautions and covers use of studs through steel into concrete, wood into concrete, wood into steel and steel into steel, as well as their use for attachment of pre-drilled fixtures. Remington Arms Co., Inc.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Foreground, DUSTMASTERS. Background, old collectors being removed.

Banister DUSTMASTERS solve large manufacturer's dust problem!

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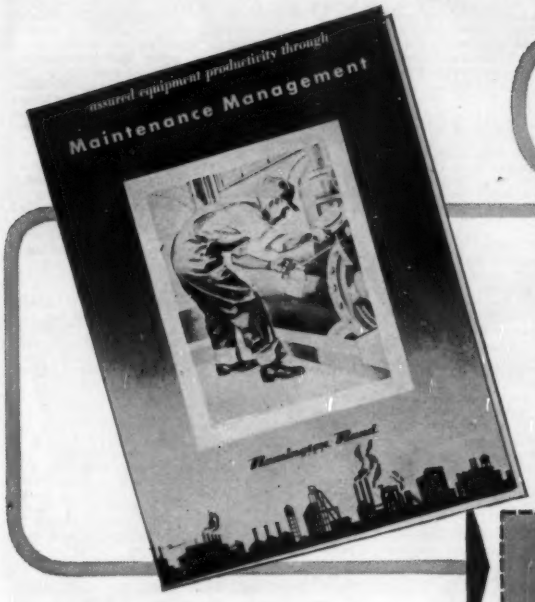

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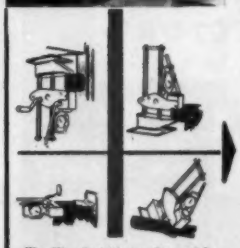
Ask for information on the many additional advantages you'll find so beneficial.



The King Portable can be used in any position—even upside down.

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DATA FILE

(Begins on page 240)

459 **Welding Positioners** — Fully illustrated, 16-pp Bulletin P1-2 outlines important features and gives condensed specifications on four welding positioners with capacities to 35,000 lb. An efficiency graph based on typical welding jobs provides a quick picture of production advantage. Welding Div., Harnischfeger Corp.

460 **Flux Recovery Equipment**—How company's flux recovery equipment salvages valuable flux, saves man-hours, and speeds and improves welding is told in this 6-pp illustrated bulletin. Describes primary recovery installations. Invincible Vacuum Cleaner and Mfg. Co.

461 **Machines for Special Products** — This 12-pp catalog lists company's machine tools and other metal fabricating, forming, treating and processing equipment which is now available for contract manufacturing. Types, quantities and operational dimensions of the facilities are included. The Jeffrey Mfg. Co.

462 **Improved Machine Mounts**—This brochure describes advantages of company's leveling machine mounts. Tells how they enable installation and leveling of heavy machines without bolting or shims, afford increased plant mobility, reduce maintenance costs, and lessen noise. Barry Controls, Inc.

OTHER EQUIPMENT

463 **Protective Lining** — T-Lock Amer-Plate, a protective lining for concrete pipe and structures, is described as to properties and uses in this 8-pp folder. Photos show production of this acid-resisting sheet from synthetic resins, pigments and plasticizers. Other photos show some installations. A table shows sheet sizes for both the ¼ and full lining of pipe diameters from 30 to 72 in. Amercoat Div., American Pipe and Construction Co.

464 **Filter Fabric Facts** — This 16-pp illustrated booklet contains information about filtration principles; filtering devices; filter media; textile fibers for filtration; a comprehensive chart on chemical and heat resistance of cotton and synthetic fabrics; sections on yarns, fabrics construction and finishing; and a round-up of filter fabrics in use. Photos illustrate variety of filter fabrics being produced for industrial use. Wellington Sears Co.

465 **Storage Shelving** — Rapid erection, strength and other advantages of manufacturer's storage shelving are stressed in this illustrated bulletin. Shows component parts, open types, closed types and some of the many combinations of dividers, bins, doors available. Also presents tool inserts, other shop equipment. DeLuxe Metal Furniture Co.

466 **Large Capacity Condenser**—Bulletin 123 describes the 400-ton capacity Aeropass condenser and fluid cooler. Explains and illustrates operating principles of the unit. Lists benefits offered for large liquid cooling and condensing applications. Niagara Blower Co.

467 **Felt, Felt Products**—This 24-pp technical design book describes hundreds of uses of felt, with emphasis on mechanical applications. Explains and illustrates how felts are used for their friction qualities, for cushioning, for filtering, for insulating, for sealing, for spacing, and as wicking. Gives design properties of felt and discusses 10 reasons for its importance to industry. Also tells how to select the proper felt for the job. The Felters Co.

468 **Industrial Leathers** — These illustrated data sheets cover company's leather products and include belting. Also give data on leather packings for hydraulic and pneumatic equipment. J. E. Rhoads & Sons.

469 **Drawing Instruments**—This 40-pp ordering booklet covers drawing instruments, drafting scales, stainless steel T-squares, straightedges, triangles and others, including a new Micro-Rule. This new instrument provides a means of measuring and laying out distances to 0.0001 in. without aid of a glass. Catalog is well illustrated with photos (many actual size) of the instruments, and includes sizes and prices, selection information and suggestions for care of instruments. Theo. Alteneder & Sons.

470 **Production Control System, Procedures** —Publication X-1268, 56 pp, details a method of material control intended to result in a shorter planning cycle while speeding production by eliminating causes of delay on the production lines. Illustrated with typical forms and charts, book outlines procedures for engineering, production planning and progress, machine load, material and tool procurement and control. Remington Rand Inc.

471 **Steam Accumulator** — How the steam supply and demand can be balanced by means of company's steam accumulator is told in Bulletin RA-52-8. Stresses reduced boiler capacity required and increased boiler efficiency afforded by use of the accumulator, other advantages. Foster Wheeler Corp.

472 **Precision in Packaging**—The advantages of automatic machine packaging are outlined in this illustrated 24-pp bulletin. Describes various packaging and sealing machines, indicates kinds of packaging machinery now being produced. Illustrates various folding carton styles. Robert Gair Co., Inc.

473 **Air Tools, Paving Breakers**—These two bulletins describe company's latest models of paving breakers and air tools for plant construction and maintenance work. Bulletin PB1 gives features and specifications on heavy-duty, medium-weight and lightweight paving breakers, as well as tools for use with them. Bulletin ST-100 describes and gives specifications for clay spaders, trench diggers and backfill tampers. Gardner-Denver Co.

474 **Industrial Fans**—Propellair Bulletin 650, 12 pp, contains dimensions, application, and performance data on Tubeaxial and Stack-booster fans. Gives information on cooling and drying problems, system and open surface tank ventilation. Robbins & Myers, Inc.

475 **Economy of LP Gas**—"The Aircraft Story," 8 pp, gives the report of a test made at one aircraft company, and results which

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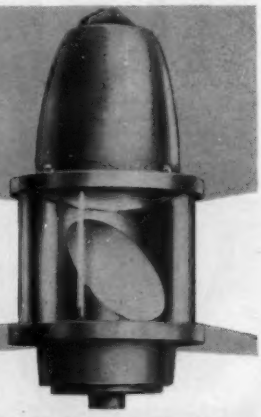

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275 BEACON RAY

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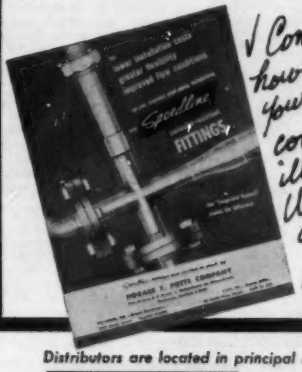

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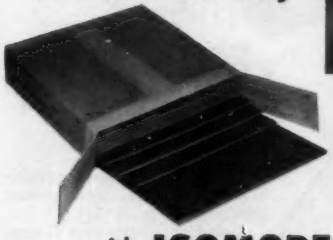

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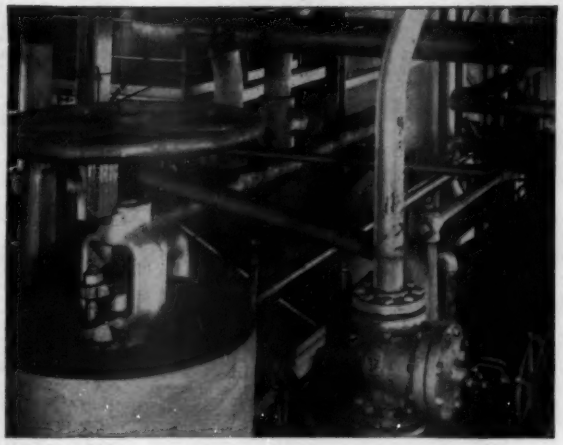

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Low cost, high performance Edward valves will save you money today and throughout life of your plant. Write for the Edward Condensed Catalog or contact the nearest Edward representative.

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...a complete line of cast and forged steel valves from ½" to 16" in Globe and Angle Stop, Gate, Non-Return (Stop-check), Check Separate Stop-Check, Relief, Hydraulic, Abrasive Fluid, Instrument, Gage, Special Designs and Strainers for pressures from 100 psi and up with Pressure-Seal, bolted, union or welded bonnets and screwed, welding or flanged ends . . . for Industry

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DATA FILE

(Begins on page 240)

another aircraft company obtained after converting their fleet of internal plant trucks to LP gas operation. Explains advantages of LP gas as an engine fuel and steps necessary in conversion of equipment to LP gas operation. American Liquid Gas Corp.

476 **Pipe Insulation**—Bulletin F 1-100 features on-the-job installation photographs of cellular glass insulation for pipe temperatures between—300 and 800 F. Complete listing of physical properties, condensed specifications are given. Pittsburgh Corning Corp.

477 **Aluminum Jacketing**—Economy and reduced maintenance offered by use of company's aluminum jacketing for insulated lines are stressed in illustrated Form J-1. Details fast application, corrosion protection afforded, other advantages. Step-by-step photos show how jacketing is applied. Childers Mfg. Co.

478 **Finishing Systems**—Illustrated Catalog A-653, 12 pp, describes complete finishing systems for porcelain and synthetic enamel, lacquer, paint, and other finishing. Also covers a variety of other industrial equipment including ovens, dust collectors. The R. C. Mahon Co.

479 **Steel Reservoirs, Standpipes** — This 24-pp booklet pictures installation of reservoirs of 50,000- to 10,000,000-gal capacity, having cone, umbrella or ellipsoidal roofs and ornamental structures with special architectural features. Chicago Bridge & Iron Co.

480 **Cupro Nickel Alloys**—The use of cupro-nickel alloys for heat exchanger tubes in power service, due to their resistance to attack by salt water used for cooling and their superior strength at elevated temperatures, is discussed in this 12-pp bulletin. Provides tabulated data on performance in specific service in various industrial fluids such as ammoniacal solutions, brines, alkaline solutions, petroleum products, organic compounds, others. The International Nickel Co., Inc.

481 **Fire Hose Reels** — Sixteen-pp Catalog H-511-F describes hose reels for fire fighting equipment, with illustrations of various models and cutaway view showing component features. Specifications, as well as descriptions of operational advantages are included. Clifford B. Hannay & Son, Inc.

482 **Physical Properties of Synthetic Organic Chemicals**—In 24 pages, booklet F-6136 presents the latest data on more than 350 organic chemicals. It features 46 new products available from this company. For easy reference, chemicals are arranged by family groups with condensed application data. Physical properties are given. Carbide and Carbon Chemicals Co., Union Carbide and Carbon Corp.

On pages 235-236 are two postage-free Reader Service Cards provided for your convenience in ordering these bulletins. You may also use the cards to order any literature mentioned in ads.

483 **Improved Quenching Oil** — A new quenching oil with thermal stability and high boiling range, particularly suitable for quenching systems requiring a high flash-point, is described in Form A-3073. Discusses advantages of this quenching oil and includes specifications. Sun Oil Co.

484 **Advice on Washrooms**—Information on company's washroom advisory service is available to plant engineers. Tells of plans and specific suggestions for improving washrooms included in this service. Scott Paper Co.

485 **Self-Locking Nuts** — This folder describes Flexloc self-locking nuts; shows how the locking action of the one-piece all-metal nut can be used either as locknut or stop nut. Applications of the nut are illustrated in small drawings. Standard Pressed Steel Co.

486 **High Temperature Thread Compound**—The advantages of company's thread compound for use in high temperatures are outlined in this informative pamphlet. Lists chemical properties, describes application and function, and offers comparison data on performance of this compound. Felt Products Mfg. Co.

487 **Metal Quenching**—Valuable information on the quenching of metals is available in this 24-pp booklet. It is illustrated with charts and graphs depicting cooling curves, cooling rates, effect of bath temperatures, agitation curves, hardness penetration curves, and transformation diagrams. Contains a series of typical case studies which detail the solution to some tough quenching problems frequently encountered. Gulf Oil Corp.

488 **Industrial Non-Metallics** — Polypenco Nylon, Teflon, filled nylons, and other non-metallics are the subjects of this bulletin. Illustrated with photos, gives characteristics and advantages of these materials, data on rod, strip, tubing and slab available. Also shows parts that can be produced with them. Polymer Corp. of Pennsylvania.

489 **Neoprene Design Book**—This illustrated bulletin discusses the properties of Neoprene, showing how they are utilized in products made from this chemical rubber. Covers its toughness, hardness range, air retention, performance under load, at extreme temperatures, flame and chemical resistance. Elastomers Div., E. I. du Pont de Nemours & Co.

490 **Metal Finishing Systems**—Bulletin HH-100 provides a quick view of the complete metal finishing equipment offered by this company. Shows washers, bake ovens, paint spray booths, pickling machines, sludge filter and other equipment. U. S. Hoffman Machinery Corp.

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Gas or electrically powered

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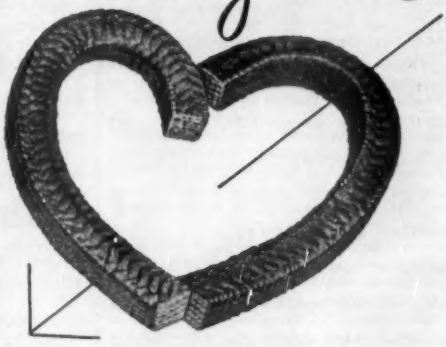

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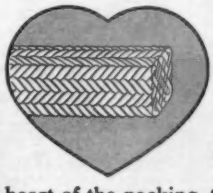
For the highest speed centrifugal pumps—or any other application where pliability and high wear resistance is required . . . PALMETTO'S latest packing development has all this plus those features that have made PALMETTO the leader in the quality packing field.

As in all PALMETTO Self-Lubricating Packings, each strand is saturated separately *before* braiding, thus assuring complete and uniform lubrication of the *whole* packing. A reservoir of lubricant is "braided in" to make perfect sealing and long service life a certainty.

INTERWOVEN FOR EXTRA STRENGTH



In conventional packing each strand is braided only with the other strands in its own jacket . . . The *extra* in Palmetto Interwoven is a special braiding process which passes each strand through the heart of the packing. Consider the strength and wear resistance this adds to the packing! With each strand locked in, abrasion from moving parts will not weaken the packing by wearing away its surface. Since each strand passes through the packing, and not just along its surface, the finished product is highly pliable—not straight-jacketed.

PALMETTO Packings

Bulletin IP-10 gives complete details . . . Write for it today!

packing more performance into every application

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NEW! 'Sexauer' Monel Self-Locking bibb screw—10 sizes do the work of 37!

NEW! 'Sexauer' Easy-Tite faucet washer with Fiberglas reinforcing

This nylon plug locks the screw *automatically!*

NEW! Amazing, patented screw and washer combination cuts faucet washer replacements 75%

—with each leak eliminated, you reduce water and fuel bills up to $28.80 quarterly

Most faucet washer failures are caused by wrong length screws. 'Sexauer' Self-Locking screws* and Easy-Tite washers*—used together—cut costly washer replacements 75%! You save up to $28.80 quarterly in water and fuel alone with each leak stopped. Here's how . . .

A screw *too short* for the tapping distorts and splits the washer when tightened; the washer works loose, is torn to shreds. If *too long*, it can't grip the washer; this ruins the washer and causes hammering in the water line.

Simplifies fitting problem—cuts installation costs

'Sexauer' Self-Locking screws eliminate the problem of misfit screws. They lock *automatically* at the required depth as the nylon plug is compressed in the faucet thread. The washer is not distorted, is held firmly.

You can re-use Self-Locking bibb screws repeatedly. Made of Monel, they resist corrosion, never rust; heads won't twist off, screw driver will not distort the slot.

Self-Locking screws save time spent in fitting the proper length—10 sizes do the work of 37! Used with new, Fiberglas-reinforced 'Sexauer' Easy-Tites, they cut washer replacements 75%, fixtures last longer. Easy-Tites resist closing squeeze and excessively hot water, outlast ordinary washers 6 to 1!

Water and fuel savings

One dripping faucet wastes 8,000 gals. of water yearly. A pinhole size stream increases waste to 8,000 gals. in a *single month!* Here is what you save *quarterly* in stopping just *one* pinhole leak on a hot water faucet:

Fuel Saving		Water Saving	Total Saving
Oil (198 gals.)	$22.77	$6.03	$28.80
Coal (2,469 lbs.)	22.22	6.03	28.25
Gas (21,103 cu. ft.)	21.20	6.03	27.23

Save water, fuel and labor costs; conserve costly fixtures by cutting washer replacements 75%! Use *new* 'Sexauer' Self-Locking screws and Easy-Tite faucet washers. *You save every time you do!*

WRITE FOR CATALOG. New 'Sexauer' Self-Locking screws and Easy-Tite washers are just part of the line of over 3,000 'Sexauer' Triple-Wear plumbing repair parts and patented precision tools. Send for our new, 126-page Catalog H. *Write today!*

*Reg. U. S. Pat. Off.

J. A. SEXAUER MANUFACTURING CO., INC. Dept. S105
2503-05 Third Avenue, New York 51, N. Y.

SEXAUER
WORLD'S LEADING SPECIALISTS IN PLUMBING AND HEATING REPAIR PARTS

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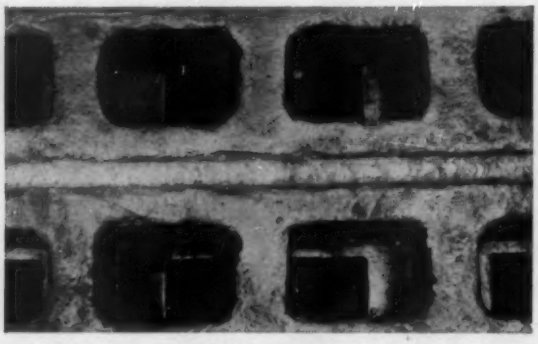
Easy Repair Welding—A bus company builds up worn valve seats of old engines with NI-ROD® electrodes. The company's maintenance chief says welding cast iron "heads" with NI-ROD is quick and easy. Cuts costs, too.

Valve Seat built up with NI-ROD is remachined. Then it's as good as new! Thanks to NI-ROD's operability it is easy to get *sound machinable welds in cast iron* . . . even for welders of limited experience.

Easy Production Welding—For a shake-out deck, a Michigan foundry joined heavy Ductile Iron sections with NI-ROD "55"® electrodes. The foundry welded Ductile Iron to itself and to steel framing with NI-ROD "55".



Here's a close-up of the NI-ROD "55" weld joint in the two main deck castings. *No preheat or postheat was used.* Yet the weld is crack-free, despite terrific battering . . . *proof you get sound welds easily with NI-ROD "55"!*

"Cast iron" proof that Ni-Rod is the easy way to weld cast irons

Try these companion nickel alloy electrodes. *Prove to yourself* how NI-ROD and NI-ROD "55" simplify *all* cast iron welding. Order a 5-lb. trial package from your supplier — 3/32-inch, 1/8-inch, 5/32-inch and 3/16-inch diameters.

And write Inco for the new folder "Repair Cast Iron Parts Quickly and Easily." It shows you *many* types of cast iron welding where these two electrodes prove so successful...helps you decide which to use in a given job.

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street New York 5, N. Y.

INCO TRADE MARK **Welding Products**
Electrodes • Wires • Fluxes

For more facts circle 707 on Reply Card

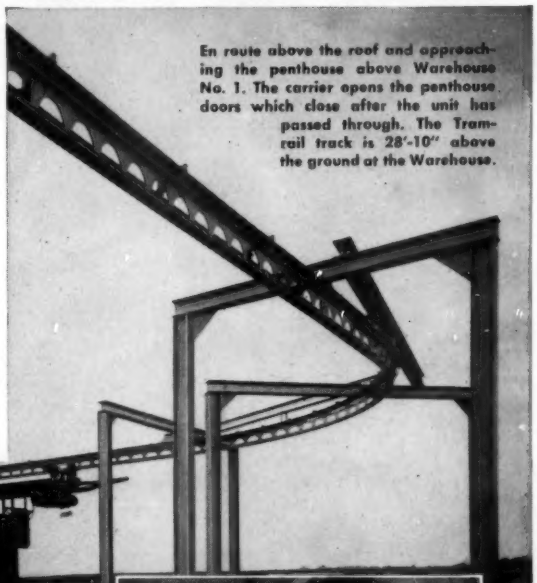
Uses Roof To Link Distant Departments

Automatic Tramrail System Saves "240 Man-Hours" Per Week

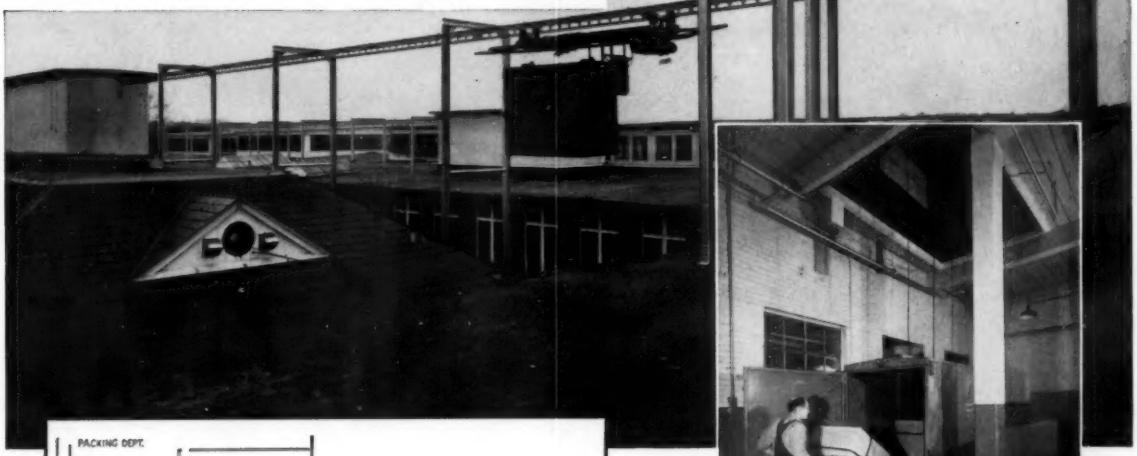
By installing a Cleveland Tramrail automatic dispatch system that extends partly over roof tops and partly between buildings, the North Carolina Finishing Co., Salisbury, N. C., was able to successfully link two widely separated departments and secure the same advantages that would be obtained if they were adjacent to each other.

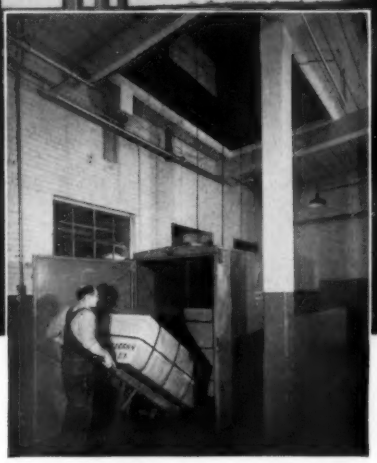
This system has been in operation since 1949. It is an excellent example of the application of a bit of imagination to overcome an awkward and costly materials handling situation. It reduces the time for movement of packaged rayon cloth from the Packing Department to the No. 1 Warehouse by 240 man-hours per week.

A wide variety of Cleveland Tramrail automatic dispatch systems is now serving industry. For real savings we suggest that you get the facts on this modern method of handling materials.

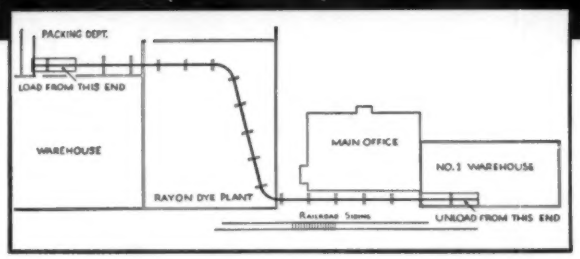


En route above the roof and approaching the penthouse above Warehouse No. 1. The carrier opens the penthouse doors which close after the unit has passed through. The Tramrail track is 28'-10" above the ground at the Warehouse.





6 to 8 cartons weighing 100 to 400 lbs. each are loaded into the Tramrail freight van. The button on wall, at left, sends the van on its way, first upward through ceiling opening, and then forward on outside roof track. The van measures 4'-0" x 8'-0" x 6'-6" high.



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CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
7505 East 290 Street, Wickliffe, Ohio

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

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WHAT'S NEW IN MOTOR CONTROL? ★ ★ ★ GET IT FIRST IN CUTLER-HAMMER

Now...the spectacular new Cutler-Hammer ★ ★ ★ Unitrol

Standardized Modular Construction

All control units are 20" wide and in multiples of 14" in height. This permits easy interchange of various sizes and types of control units without rearrangement of the entire control assembly and avoids wasting space with dead panels to adapt non-uniform control units. This standardized modular construction also insures good appearance at all times because horizontal lines match.

Star studded with features that provide fastest installation or rearrangement of motor control, maximum space economy, unparalleled motor control performance and new safety for men and equipment.

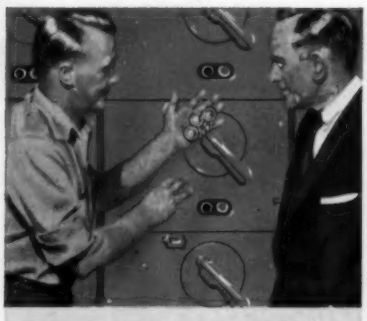
Fifteen years ago Cutler-Hammer Unitrol pioneered the idea of flexible control centers . . . the modern way to organize control equipment for better performance, greater safety, and quick rearrangement to meet industry's constantly changing control requirements. Few engineering advances ever received such enthusiastic acclaim or such rapid widespread use. Through the years there have been many imitations, but only *one* Unitrol.

Today Cutler-Hammer engineering leadership opens another new era in flexible control centers with the great new Cutler-Hammer ★ ★ ★ Unitrol. Star studded with features that permit new speed in installation, new speed in any reorganization of the equipment, more control units in less space, new safety for men and equipment and new motor control performance that simply has no equal. Whether you desire truly modern control for just a few machines, a full department or an entire factory, be *sure* you have all the facts about the new Cutler-Hammer ★ ★ ★ Unitrol before you buy. Write or wire today . . . CUTLER-HAMMER, Inc., 1447 St. Paul Avenue, Milwaukee 1, Wisconsin.

CUTLER-HAMMER
★ ★ ★
UNITROL
C-H

Unitrol Uni-Plug Saves Time

Uni-Plug automatically connects each control unit to its power supply when the unit slides into operating position. It also assures complete disconnect whenever the unit is pulled forward for inspection or attention. All units can be locked in "disconnect" position. Unitrol Uni-Plug thus saves wiring and rewiring time—and insures safety.



Self-Aligning Disconnect Operators

Unitrol control units can be equipped with either fused disconnect switches or circuit breakers. Both types have self-aligning three-position operators which are arranged for padlocking with as many as three locks in "off" position.

The name UNITROL is a Cutler-Hammer trade mark.

New C-H Three-Star Control Units

New Superlife Vertical Contacts end care and costs for all time in normal control uses. Adjustable Load Sensing Coils with 3% overload accuracy (compared to usual 12%) permits motors to work harder safely. Full 3-Phase Protection now costs as little as $6 (list price) additional per control unit. Compare this with the cost of just one motor burn-out.

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Plant Engineering

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The magazine that helps **plant** engineers with their everyday problems